STEEL
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Next Week: **... A GUIDE FOR STEEL BUYERS ... Radioactive Tracers Detect Soil on Cleaned Surfaces ... Arc-Cast Molybdenum Probed for High-Temperature Utility**

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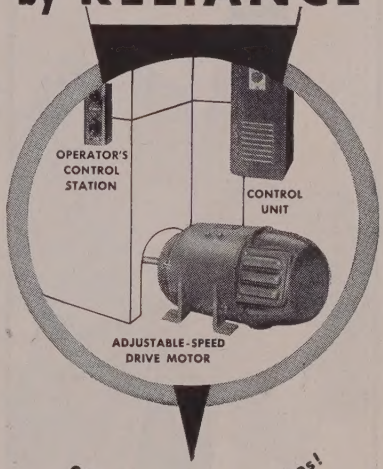

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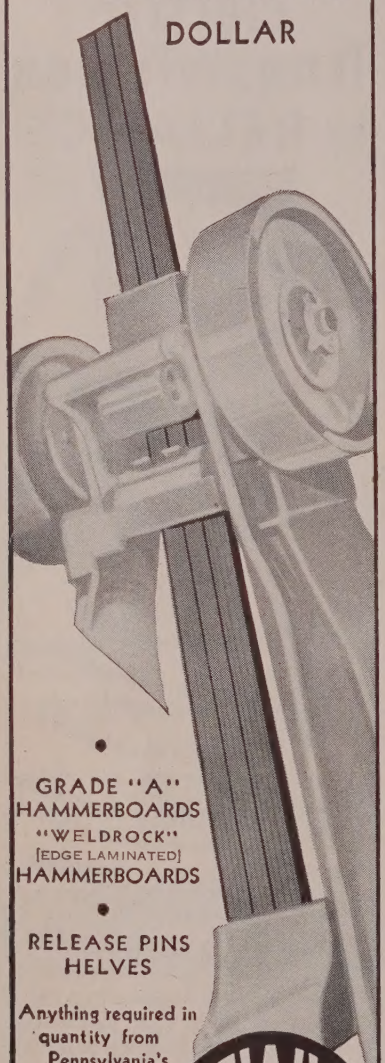

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Behind the Scenes . . .

Close Call

We went downstairs the other day to see Andy Anderson, production manager for STEEL, just after he had all the ads accounted for in the 454-page yearbook issue of Jan. 1. We expected to find him spent and exhausted but discovered him as fit as ever after putting together that book which was nearly a record in size. Our 1943 annual issue was a shade larger—460 pages all told.

"But I did have one close call this year," said Andy. "Bethlehem's plate did not arrive at the deadline; evidently it got sidetracked somewhere in the Christmas rush."

Andy called up the company, suggesting they substitute some other ad for the missing one. That was bandied about for a while, but Bethlehem President A. B. Homer said the original ad should go. So another plate was readied by Philadelphia electrotypers who sent it by their own man via plane to Cleveland. Andy met the fellow at the airport at 8:30 in the evening, then rushed it back to the Penton building where it was on the presses a short time later.

No wonder that Bethlehem wanted to run its original ad, for it told how the company's steel ingot capacity is now at 16 million tons, 1 million more than a year ago.

Cover Stories

Artist George Farnsworth did the titanium cover this week. He got his idea and did the initial artwork while snowbound in his home during the Great Storm late in November. The job, of course, ties in with Art Allen's comprehensive report on titanium which begins on page 54.

Next week's cover will refer to the guide for steel buyers, Associate Editor Vance Bell's opus that will be a comprehensive analysis of where and from whom you can buy what sizes and shapes in about 180 steel products. His job is keyed with STEEL's weekly pricing service. The two together will give you the most complete steel purchasing guide available in the U. S.

Far-Flung Correspondents

Our puzzle fans are all over the place. We received this note a while back from Mrs. Bartolomeu de Nag of Lisbon, Portugal, in which sh gave the correct answer to the No 27 problem about how a famil crosses a river.

"This is not the first time that am able to give a correct answer t your most interesting puzzles, m husband being a subscriber to STEE as a matter of fact the only one i Portugal. I hope you are intereste to receive my answers in time an that in the future you will do yo best to shorten the arrival of you precious magazine."

Mrs. de Nagy is right about h puzzle answer but inaccurate abo her husband being the only STE subscriber in Portugal. There a three others.

Puzzle Corner

Space was at a premium last wee in the annual issue, so we had to di pense with the puzzle and answer f a previous one. The seven guests i the restaurant problem of Dec. 18 m in 420 days. First in with that a swer were Robert, son of R. W. Hu of Republic Steel Corp.; Gustaf Po son of Judson L. Thomson Mfg. Co David M. Romsey Jr. of Republ Steel Corp.; C. E. Norton of Hig land Park, Ill.; and P. C. Bertels of Ford Motor Co.

The fence in the Dec. 25 puzz should enclose a rectangle one fo wide and nine feet long. Two mo one-foot boards, one at each end, w double this area. T. S. Bean of Ba ber & Ross Co. and James S. Mill of Armco Steel Corp. came throug on that one.

M. S. Bailey of Machine Pro ucts Corp. has an alternate answ whereby no additional boards wou be needed to double the fence e closure. Enclose a triangular are bounded by three sides, 9 x 9 x 2 fe To double that, reconstruct the fen with existing boards to enclose a tr angular area 6 x 6 x 8 feet.

E. J. Sampson of Brockton, Mas submits this one: 15 politicians a 15 statesmen are arranged in a circ on a ship. Every ninth person sacrificed so that half the total nu ber are lost. Arrange the order that the politicians are lost and t statesmen are left.

Shrdlu

(Metalworking Outlook—page 17)

The Metalworking Outlook

Full Mobilization—Soon a Reality

Full-scale industrial mobilization will be a reality by next fall. Wage, price and distribution controls will be coming fast for the next three months; then, a levelling off as industry tries to get used to new traces. You'll begin to notice civilian production cutbacks by March. Mobilization Boss C. E. Wilson is getting his feet on the ground. Indication: Shakeup in the defense setup with W. H. Harrison as new Defense Production Administrator. You'll probably continue to do business with your old contacts at NPA and in Interior. Watch for simplification of NPA's confusing orders and regulations.

Price Formula Shaping Up

A price control formula will be worked out by March that probably will permit some increase within the control framework. Wage Stabilizer Cyrus H. Ching is calling industry-labor meetings Jan. 10-12. Price limitations on autos are generating behind-the-scenes bickering in the industry. Some suppliers have raised quotations, say they aren't affected. Rollbacks to Dec. 1 in other industries have been made, by Allis-Chalmers, International Nickel and others.

Manpower: Tighter and Tighter

Manpower in the coming year will be as tight or tighter than at any time during World War II. Employment hit an alltime high of 62.4 million in August when there was relatively little defense output; that record will have to be shattered in 1951 if we're to produce both defense and civilian goods. Labor Department is establishing a system of regional and area Management-Labor Committees on Defense Manpower. In coming months, the "electric brains" developed at M.I.T. and elsewhere will become more than a scientific curiosity. They'll be used to save labor. Already designed is an electric brain lathe, controlled by electric tape, which will automatically turn out a finished product.

Materials Shortages: Worse and Worse

Materials shortages will get much worse in 1951. Already, steel needs for direct defense have been hiked from 1.5 million to 2 million tons (p. 31) for the first half. Bad weather has cut ferrous scrap collections so badly that some kind of pooling arrangement will have to be worked out. That has affected scrap prices which will shortly be controlled. Aluminum is one of the tightest nonferrous metals. Watch for an NPA order to conserve the material by prohibiting the mixing of various types of aluminum scrap.

Troubles in Transport

A transportation shortage will hit you in 1951. The nation's need for new freight cars will not be met despite capacity pro-

on-Engineering News—p. 53 Market Outlook—p. 91

duction in the next 12 months. We need 20,000 new cars per month, hopelessly above the present 10,000-per-month capacity. Even so, railroads have greater carrying capacity than at the time of Pearl Harbor. That means more truck and water transportation. The 168,000 employed in American shipyards will be increased in coming months. Truck and trailer output will not be curtailed.

Conveyor Belts and Dirigibles

The transport scarcity will boom plans for long-distance conveyor belts and airlift dirigibles in 1951. Railroad lobbies will have a more difficult time this year blocking the belt conveyor from Lorain to East Liverpool, O. Goodyear is again plumping for big Zeppelin type airships to supplement America's airlift as large-capacity, relatively high-speed cargo carriers.

Rush To Get Into Aviation

Automakers are rushing to get in on part of the aviation program as the outlook darkens for high auto production. GM, Kaiser-Frazer and Ford already are in on various phases. Studebaker wants to build engines, is dickering for a contract.

A Lift from Titanium

Titanium may help you in 1951. Its strength and corrosion resistance means that it has a great future in metalworking. Technical developments may soon surmount the problems of its high cost and short supply. The military now gets nearly the entire production, about 2000 pounds a day (p. 54).

South American Steel

South America may become an important source of steel for the U.S. Virtually all imports now come from Europe. Pig iron is already arriving from Chile's new mill near Concepcion. The mill can produce 236,000 tons of ingots a year; with a relatively small additional investment, it can boost that to 350,000 tons yearly. Columbia will build a mill at Paz del Rio.

What Industry Is Doing

Programs underway or projected will boost ingot capacity to 113 million tons, not 110 million as first estimated; most of the projects will be completed by the end of 1952 (p. 25) .. . . . U. S. Steel is installing thawing devices to ship 2 million tons of iron ore by rail to its plants this winter in an unparalleled operation (p. 27) . . .. Defense bought more than $9.2 billion worth of major items from July through November, 1950 (p. 28) . . . NPA orders increase (pp. 30-31) . .. .. Government economists are more alarmed than they admit publicly at the rising inflation (p. 43) . . .. U. S. Steel's Consolidated Western Steel Corp. is induction welding 36-inch pipe . . . The report on the Celler Committee's study of monopoly power relative to the steel industry—hearings were held early last year—contains neither recommendations nor conclusions.

STEEL
A PENTON PUBLICATION

January 8, 1951

Progress—But Slow

For weeks to come heads of many industrial companies are going to be chafing at the bit because they can't do what they want to do. They want to keep the men and machines in their plants busy. Some already are and more will be stymied in this desire because shortages of materials or government restrictions force curtailment of activity on civilian orders and because the volume of war orders is not yet sufficient to take up the slack.

Hundreds of companies in the metalworking field already have been forced to lay off some employees. This situation is bound to get worse before it gets better. We must go through this disagreeable ordeal because months ago, when the nation could have been setting up adequate plans for the swift conversion of facilities, our government badly underestimated the size and timing of the job. We were told that the existing government agencies could do it satisfactorily. The President sent a boy to do a man's work.

Fortunately events in Washington during the past few days afford hope that the government at long last is awakening to the needs of the hour. Defense Mobilization Chief Charles E. Wilson is being given more authority. Last Wednesday President Truman established a Defense Production Administration which will function under Mr. Wilson. This and other recent actions go a long way toward removing authority from the various executive departments and concentrating it in Mr. Wilson's office. This should help to dispel confusion and to speed action.

In the meantime, if Mr. Wilson's mobilization efforts are to be successful, he must be given more definite specifications as to what is needed to meet the present crisis. These specifications have not been furnished in quantity by the military because our foreign policy is not clearly formulated. The divergent views of Truman, Acheson, Dewey, Hoover, Dulles and others must be weighed and a definite policy established that will command the support of a substantial majority of Congress and of the people.

War orders are beginning to flow to metalworking companies in increasing volume. They could flow more freely if we could make up our minds as to how, where and when we are to conduct our defense against the enemy.

* * *

A LOOK AT TITANIUM: "Must" reading in this issue is "Titanium—How It Fits In Your Tomorrow," by Associate Editor A. H. Allen. It deals with the fascinating developments which have followed the announcement on Sept. 14, 1948, by du Pont that it had succeeded in extracting titanium from its ores on a commercial basis.

Titanium is commanding major attention because it seems to satisfy a current need in the field of structural materials. It exhibits exceptional strength per unit weight at normal temperatures and unmatched resistance to corrosion—qualities urgently sought in aircraft and marine applications. Problems of ore reduction and melting to date have restricted output to about 2000 pounds per day, most of which is commandeered by the military.

That the bottleneck of production may be broken soon is indicated by the roster of important companies that are spending millions on the problem. Supplying titanium, in addition to du Pont, are National Lead in collaboration with Allegheny Ludlum Steel, Remington Arms working jointly with Crucible Steel of America, Kennecott Copper co-working with New Jersey

(OVER)

Zinc, and P. R. Mallory & Co. Republic Steel, Sharon Steel and Universal-Cyclops have rolled titanium experimentally. Among fabricators which have worked with titanium are Transue & Williams, Pratt & Whitney, Douglas Aircraft, Curtis Propeller, General Electric, Westinghouse Electric, American Welding & Mfg. Co. and Linde Air Products. Government and private research organizations are striving feverishly to speed progress in titanium.

These developments will bear watching. Titanium may be an exceedingly important metal of tomorrow. —p. 54

* * *

EAST'S NEW LEVERAGE: Latest count on expansion of steel ingot capacity in the United States puts total capacity at the end of 1952 nearer to 113 million tons than to the 110 million previously estimated. The upward revision in outlook for steel capacity is accompanied by a corresponding boost in capacities of rolling and finishing facilities.

A major project contributing to the revised estimate is the new steelworks planned by National Steel Corp. on a site adjacent to the Delaware river 10 miles south of Camden, N. J. This site is not too far downstream from U. S. Steel's new Fairless works, construction of which will begin in a few months. Finished steel will be shipped from the Fairless works within six to 12 months after construction work starts.

These two Delaware river projects will exert a strong counter leverage against the western drift of steel capacity occasioned by recent expansion in the Southwest and Far West. —p. 25

* * *

EXPENSIVE EXPEDIENT: Shipment of iron ore by water from upper to lower ports of the Great Lakes constitutes the smoothest and most economical transportation service in the world. This year, for various reasons, this service has not been equal to demand. During the last summer, U. S. Steel augmented its lake shipments by 1.5 million tons of ore brought down by rail.

Now the corporation is planning to ship 2 million tons by all-rail during winter months. Half will go to Pittsburgh, a quarter to Youngstown and an eighth each to Gary and South Chicago. This is an ambitious undertaking and one that could not be justified except under emergency conditions. It is an excellent illustration of the lengths to which private industry will go to meet a challenge when the chips are down. Handling frozen ore in gondolas is not child's play and it's expensive. —p. 27

* * *

TRY THIS CHECK LIST: Last week our editors spent an ungodly number of man-hours trying to reconcile the various government control orders with the numerous amendments, directions, supplements and delegations issued after the initial ukases (ukase is from the Russian) went out. On the basis of this hectic experience, they decided to inaugurate for the duration a weekly checklist, by which readers can keep abreast of the current status of governmental control orders.

In this week's issue is presented the list for all orders and their subsequent modifications for the last four months to date. Hereafter in each issue the new orders and changes of old orders during the week will be reported. We think this service will help you to detect promptly any alterations in orders which affect your business. This may turn out to be a formidable task, but we're prepared to go through with it to the limit of our abilities. —pp. 30, 31

* * *

AUTO GADGETS GALORE: General Motors has been developing a "dream" car in which is incorporated many advanced ideas that may or may not find acceptance in stock models of the future. This car of tomorrow, named Le Sabre, exists only as a plaster model, but in the next few months it will be built in metal.

It will utilize lightweight aluminum and magnesium alloys in body and engine. Its 300-horsepower engine will be fed by a dual fuel system supplying premium gasoline and methyl alcohol. It will have two batteries to power Le Sabre's unusual electrical devices. The instrument panel will look like that of an airplane. Doors and windows will be electrically controlled and—hold your breath!—built-in hydraulic jacks for each wheel can be controlled from the instrument panel. Also the convertible top will go up automatically when rain hits a sensitized spot between the seats.

Ye gods, what luxury! Yet much stranger things have come to pass. —p. 39

E. C. Shaner

EDITOR-IN-CHIEF

STEEL
A PENTON PUBLICATION

eel Expansions Mount

Programs underway or projected will hike the ingot capacity to 113 million tons, not 110 million as first estimated. Most will be finished by the end of 1952

STRUCTION underway or pro-d will boost America's steel in-capacity to nearly 113 million Most of the expansions will be pleted by the end of 1952. As nally estimated, the ingot ca-y would have been only 110 mil-tons two years from now.

eel expansion programs planned id-1950 would have boosted ca-y by the end of 1952 by 9.4 mil-tons. The Korean war and the amortization provision approved September in the new tax law spurred construction plans, and rams now revealed will hike the making potential by more than illion tons.

g Chunk—The first 19 steel pro-ns to be approved for five-year write-offs by National Security ources Board will add 7 million to ingot capacity (STEEL, Dec. p. 65). U. S. Steel Corp. has just ved approval on several proj-They and other U. S. Steel nsions will boost the potential her 4 million tons by the end 952. Largest U. S. Steel program be the Morrisville, Pa., works h eventually will be able to pro-1.8 million ingot tons a year.

oosting the expansion in steel-ing potential to more than 12 ion tons may be National Steel o.'s projected mill in New Jersey t revealed in STEEL, Dec. 25, p. and additional programs to be ertaken by other companies. Na-al has not announced the size of ew mill, but it will be large.

ot Neglected—Finishing facilities 't be forgotten in the steel ex-sion program. Some of the cost the projects approved for fast rtization will be for end-product pment. U. S. Steel's $443.8 mil-program—a certificate of neces-for five-year write-off was ap-ed for much of it Dec. 28—in-es finishing facilities, notably at risville.

n Dec. 28 NSRB also issued certi-tes on part of these programs h will include finishing equip-t: Wheeling Steel Corp., $8,750,-Allegheny Ludlum Steel Corp., 66,000; Jones & Laughlin Steel Corp., $2 million; Thomas Steel Co., $1,142,417.

National Steel To Build in Jersey

National Steel Corp. will build a steel mill on tract of more than 2000 acres on deep water of the Delaware river in New Jersey about 10 miles south of Camden.

Plans are being developed to determine what steel products the new plant will make. No date has yet been set for the start of construction. National's present ingot capacity is 4.5 million tons a year. A program of expansion now underway at various other National operations will be largely completed early in 1952 and will increase the company's capacity to 5.5 million tons. That total will be further increased by the capacity of the proposed new operation. Iron ore for the eastern plant's blast furnaces will be transported directly in ocean-going carriers from the Labrador-Quebec ore field.

Morrisville Job Starts in Spring

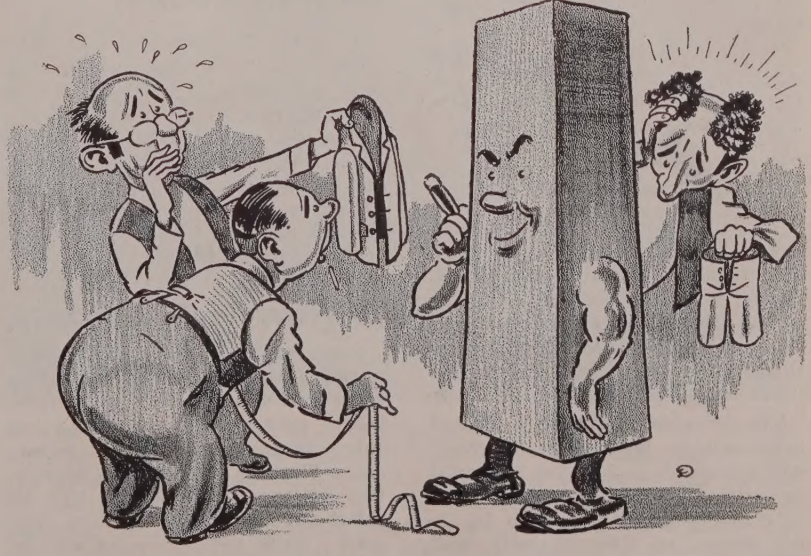
U. S. Steel Corp.'s new Fairless works at Morrisville, Pa., opposite Trenton, N. J., on the Delaware river will start rising sometime early next spring.

Within six to twelve months after construction work begins, the first finished steel products are expected to start rolling out of the seaboard plant.

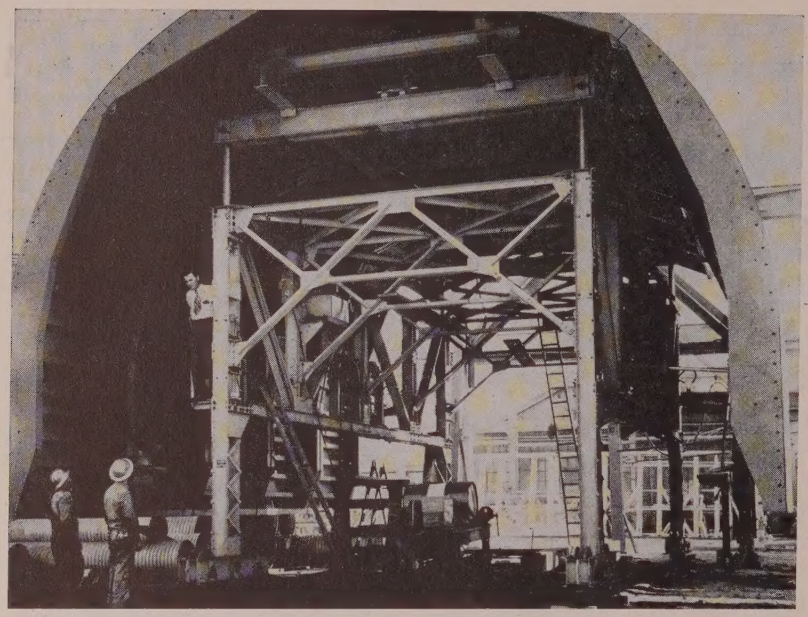
The Fairless works will have an initial annual capacity to produce 289,000 tons of cold-rolled sheets, 235,000 tons of hot-rolled sheets, 281,000 tons of standard pipe, 285,000 tons of bar products and 170,000 tons of tin mill products.

Among principal facilities will be a coke and coal chemical plant, including two 85-oven byproduct coke batteries with an annual capacity of 916,000 tons of coke and additional tonnages of coal chemical products; two blast furnaces with an annual capacity of 1.2 million tons of pig iron; nine open-hearth furnaces with an annual capacity of 1.8 million tons of ingots; an 80-inch hot strip mill and hot strip finishing facilities; finishing facilities for cold-rolled sheets and tin plate; a bloom-slab mill and auxiliary facilities; a billet mill and auxiliary facilities; and a bar mill with a size range from ⅜ inch to 2 inches.

National Tube will install facilities at Morrisville to produce standard pipe, including a skelp mill, two Fretz-Moon continuous butt weld pipe mills to produce 281,000 tons of ½-inch to 4-inch butt weld pipe annually, pipe galvanizing facilities



Seel Growth: Another Measurement Needed



TELESCOPIC TUNNEL FORMS: The Vernon, Calif., plant of Consolidated Western Steel Corp. fabricated these steel tunnel forms that will be used on San Francisco's Broadway tunnel. When concrete is poured in the 45-ton steel forms, the 14-ton hydraulically operated traveler (inside the form) moves the steel forms in place. While the concrete is setting around one form, the traveler is used to collapse the other and expand it in place for the next pour

and a warehouse of 30,000 tons capacity.

National Tube will operate the pipe-producing portion of the new plant, while the remainder of Fairless works will be operated by U. S. Steel Co., formed Jan. 1 from the merger of Carnegie-Illinois Steel Corp., U. S. Steel Corp. of Delaware, H. C. Frick Coke Co. and U. S. Coal & Coke Co.

The new plant will eventually use part of the high grade ore from Venezuela. Pending the availability of Venezuelan ore, the works will utilize other foreign ores as well as domestic ore.

Some 4400 production workers will man the plant whose markets will be mainly in the Middle Atlantic, New England and overseas areas.

Extrusion Tube Plant for Gary

National Tube will install a large extrusion plant to manufacture high alloy seamless specialty tubes, as well as shapes and bars, at its Gary, Ind., works. The application of the extrusion process on a commercial basis to the manufacture of seamless steel tubes is an innovation in the U. S.

The facilities, which will be housed in an existing building at the plant, will consist of a 2500-ton hydraulic extrusion press and related facilities to make tubes ranging from 1½ to 6½ inches in diameter with wall thicknesses up to ¼ inch and lengths up to 60 feet. The new installation will also be capable of producing various shapes and bars from ½ inch to 4½ inches. The extrusion plant will have a capacity of about 3000 tons of special tubes and shapes per month. Operation of the facilities should be possible before the end of 1951.

The French Ugine-Sejournet process for the hot extrusion of metals, using glass as a lubricant, will be employed in the operation.

Geneva Boosts Capacity

U. S. Steel's Geneva Steel Co. will boost its annual steelmaking capacity from 1.4 million to 1,560,000 tons in about a year.

Facilities to be added include one open hearth, two overhead cranes, and one two-hole soaking pit furnace. When the project is completed, Geneva will have ten open hearths and 16 soaking pit furnaces.

Blast Furnace To Be Expanded

Blast furnace capacity at the Ohio works of U. S. Steel Co. in Youngstown will be increased by 112,000 tons a year with the rebuilding and enlarging of the plant's No. 5 furnace. Work on the unit and installation of two turbo-blowers will be completed by next summer. The stack's daily rated capacity will be increased by more than 300 tons.

TCI To Add 500,000 Tons

Tennessee Coal, Iron & Railroa Co. will increase ingot capacity 500, 000 tons by additional open hearth and auxiliary facilities. The expan sion will raise the capacity of thi U. S. Steel subsidiary from 2,850,00 tons to 3,350,000 tons.

Blast furnace output will be raise through the blending of rich importe ores with the lower grade Alabam ores. To handle foreign ore import including eventual shipments fron Venezuela, ore transfer facilities wil be installed on a 36-acre tract i Mobile, Ala., acquired last summe

TCI obtained a certificate of nec essity for $41,525,000.

Pittsburgh Area Capacity Rises

The Pittsburgh district boosted it ingot capacity by more than 1 mi lion tons in 1950 and plans now ur der way or projected will hike th potential still more in 1951 and 195 The area's capacity is now 20,151,00 tons, compared with 19,147,000 ton a year ago.

Pittsburgh Steel Co. is increasin its ingot capacity at Monessen, Pa by 50 per cent to 1,560,000 tons. has received approval on fast amor tization of the cost of enlargin twelve 140-ton open hearths to 22 ton units.

Crucible Steel Co. of America enlarging 11 open hearths and 4 ele tric furnaces at Midland, Pa. At th end of the year, its capacity was u 40,314 tons to 1,095,011.

Universal-Cyclops Steel Corp. wi increase its electric furnace capacit this year from 54,120 tons to 70,1 tons.

In the Wheeling area, capacity 1950 was boosted 490,000 tons, due part to a 204,000 ton expansion Wheeling Steel Corp. and rehabilit tion of four open hearths at the T ronto, O., plant formerly owned Follansbee Steel Corp. Weirton Ste Corp. has expansions in progres some of which have already bee completed.

Jones & Laughlin Steel Corp.'s pr viously revealed program will boo its capacity in Pittsburgh by 1.2 mi lion tons by installation of 11 op hearths.

U. S. Steel Corp. has projects u derway in Pittsburgh and Young town which will boost the areas' c pacity by 1,660,000 tons. Much of t program is already completed.

Wheeling Steel has received a proval for fast write-off of $8,750,00 much of which will be used to bui a new coke oven battery.

. Steel Ships Ore through Winter by Rail

Two million tons will be moved from Upper Lakes to Pittsburgh, Youngstown, Gary and South Chicago by March to bolster short water shipments

OLSTER its iron ore supplies, . Steel Co. (Carnegie-Illinois Corp. until Dec. 31) has just ed all-rail shipment from Dulnd Two Harbors, Minn., to its urgh, Youngstown, South Chi- Ill., and Gary, Ind., plants. s the first time in history such fort has been undertaken be- lake shipping seasons.

l—The object will be the ship- of 2 million tons before Mar. ith 1 million to go to Pitts-, 500,000 to Youngstown and 0 tons each to South Chicago Gary. U. S. Steel in its first er all-rail shipments inaugurat- July and concluded in Novem- dded 1.5 million gross tons to e piles.

ore will be brought down di- from the Proctor yards of the h, Misabe & Iron Range Rail- to the various points. That rail- ore cars will be used, giving activity they otherwise would ave. Normally they are idle in roctor yards during the winter. use of these cars has the fur- advantage of not placing a drain standard freight car supply.

Thaw—At each destination, ars will undergo thawing. Steam ment has been provided and the ng will be accomplished by in- g through poke holes in the steam lances or lengths of per- ed pipe attached to hoses gh which steam is forced.

st shipment of ore—49 cars— ed in the Chicago district Jan. ecause of lack of space and nec- y facilities at the South Chi- and Gary plants, all winter ents will be handled at 101st nd the Calumet river. Here the ill be thawed out, unloaded and led into barges which will de- it to the South Dock at South s and to the docks in Gary.

ntracting Job—All of the work ing performed by outside con- under contract. Seven tracks available, three of which are ntly having thawing equipment led. The remaining four tracks ut thawing equipment will be d for working space. Each ing track, approximately 1000 long, will accommodate 40 cars 60 tons to the car.

e thawing equipment is a single -diameter steam pipe running each side parallel to the rail- tracks. From this pipe, smaller pipes, called steam lances, branch off to carry the steam into the cars. Standard ore cars have holes in their sides to receive lances. In the South Chicago installation, the lances are not perforated but have solid sides with swaged ends. The method of thawing is the same as used at the docks in Minnesota.

Getting Up Steam—Installation of 250 thawing units, each with four lances, is being done by the Chicago Concrete Breaking Co. Steam is being provided by four old locomotives leased from the Chicago, Burlington & Quincy Railroad. Length of time required to thaw the ore remains to be determined.

The ore after thawing will be unloaded on a belt conveyor which will load it into the barges. For this purpose, United States Steel Co. has leased the facilities and personnel of the Rail-To-Water Transfer Corp. which is adjacent to the thawing tracks. Tugs and barges are leased from Great Lakes Dredge & Dock Co.

Present ore stockpile of the company in the Chicago district is nearly 7 million tons of all types. With the rail shipments scheduled to continue until March 15, another half million tons is expected to be delivered. A year ago the stockpile was about 5.5 million tons.

Award Lakes Freighter Contract

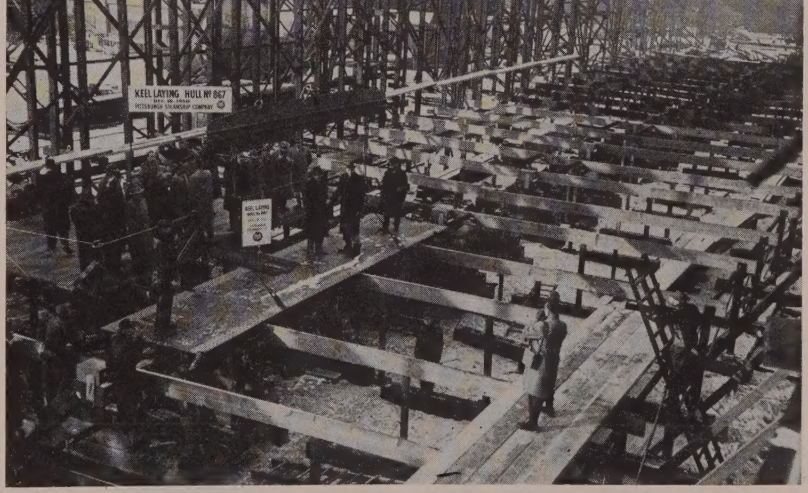
Manitowoc Shipbuilding Co., Manitowoc, Wis., was awarded a $6 million contract to build a Great Lakes freighter for American Steamship Co., Buffalo, N. Y.

The new self-unloader is to have a keel of 627 feet which will be laid at Manitowoc next fall. The ship is scheduled for completion by the start of the 1953 navigation season. Capacity will be 18,000 gross tons. Discharge rate will be from 2500 to 3000 tons per hour and speed with cargo will be 16.5 mph.

Inland To Lengthen Boat

Inland Steel Co. will stretch the capacity of its ore carrying fleet of five Great Lakes vessels by lengthening the hull of one of its older boasts, the *Philip D. Block,* while it is laid up this winter.

The *Block,* built in 1925, will be opened amidship for addition of 72-foot new midsection extending its length from 600 to 672 feet. This will bring it within 6 feet of length of the *Wilfred Sykes,* Inland's flagship and largest vessel on the lakes. The reconstruction to be completed by Apr. 1 will give ship ore capacity in excess of 14,000 gross tons against



MORE BOTTOMS: The lack of lake carriers is one of the reasons why U.S. Steel is bolstering its ore supplies by all-rail shipments. One of the many bottoms that will alleviate the ore shortage is this keel plate being moved into position for construction of hull No. 867, a 19,600-ton capacity carrier for Pittsburgh Steamship Co. Shaking hands in the center of the picture are Walter C. Hemingway, president of Pittsburgh, and W. H. Gerhauser, president of American Shipbuilding Co. Scene is at the Lorain, O., works of American Shipbuilding

its average cargo for 1950 season of 12,800 tons.

Lengthening will be done by American Shipbuilding Co. at its South Chicago yards.

For a normal season which permits a vessel 33 trips between the company's Indiana Harbor plant and ore loading docks at Superior, Wis., the vessel should carry 468,000 gross tons against the 422,000 tons it floated in 1950.

Taconite Pellets Tested

Tests are being made at Youngstown Sheet & Tube Co.'s Campbell, O., plant with iron pellets extracted from taconite.

About 35,000 tons of the pellets have been shipped from Minnesota to the local plant. Mixed with some direct shipping iron ore, that represents about a month's supply for one blast furnace.

Some of the iron pellets are being smelted in a blast furnace, and some also will be used as open-hearth charge ore, to determine its value.

The iron pellets were produced by the Erie Mining Co. in its taconite processing plant.

Iron and steel experts are carefully watching the Campbell works tests, which may enable the furnaces to increase their yield and cut coke consumption per ton of iron produced, because of the high (68 per cent) iron content of the pellets.

November Pig Iron Output Off

The nation's blast furnaces turned out 5,386,838 net tons of pig iron, ferromanganese and spiegeleisen in November, to operate at 91.4 per cent of capacity. In October, 5,924,427 tons were produced, and 97.4 per cent of the capacity was utilized.

Scrap Men To Hear De Seversky

"More scrap for more steel for defense" will be the theme of the Institute of Scrap Iron & Steel's convention opening in Hotel Commodore, New York, Jan. 14. A feature of the convention will be an industrial exhibit by suppliers of machinery used by the scrap industry.

Maj. Alexander P. de Seversky, aviation authority, will be the banquet speaker.

Military Contracts Up

GM leads all companies with 49 contracts totaling more than $138 million

MORE THAN 6200 contracts awarded to about 3200 American companies for military needs valued at upwards of $1.6 billion were announced through the Office of Small Business of the U. S. Department of Commerce during the first five months of the Korean War.

Those figures were disclosed with the publication of a new Directory of U. S. Government Contracts and Contractors by U. S. Bid Information, a private company supplying a daily bid information service to subscribers throughout the U. S. The directory discloses that 2366 contracts—more than one-third of the total—were for $50,000 or less.

The Top 25—General Motors Co led all others with 49 contracts t taling more than $138 million. B the company awarded the greate number of contracts was Bendix A ation Corp. and affiliates, with 1 orders totaling more than $42 m lion. The top 25 companies, w number of contracts and total dol values of contracts, are:

Company	No. of Contracts	Total Va
General Motors Corp.	49	$138,308,
Republic Aviation Corp. ..	10	97,989,
Lockheed Aircraft Corp. ..	18	58,979,
Douglas Aircraft Co., Inc.	17	46,865,
Bendix Aviation Corp. ...	107	42,125,
Willys-Overland Motors ..	13	39,806,
Ford Motor Co.	2	36,413,
Winston Brothers Co.	1	30,800,
American Car & Foundry..	1	30,000,
Wright Aeronautical Corp.	9	26,499,
North American Aviation Inc.	15	17,894,
General Electric Co.	54	17,116,
Standard Oil Co. (N.Y.)..	10	14,248,
Standard Oil Co. (Calif.).	20	13,217,
Sperry Corp.	21	12,169,
Lycoming-Spencer Div. Avco Mfg. Corp.	3	11,591,
Boeing Airplane Co.	11	11,585,
Pioneer Parachute Co., Inc.	6	10,996,
Continental Motors Corp. .	5	10,232,
Federal Telephone & Radio Corp.	7	10,156,
Goodyear Tire & Rubber Co. Inc.	34	9,408,
American Woolen Co.	3	9,391,
Continental Oil Co.	5	9,240,
Federal Cartridge Corp. ..	1	8,603,
Western Electric Co.	19	7,305,

Big Spender — During the f months of July through Novemb 1950, Department of Defense oblig ed more than $9.2 billion for the p curement of major materiel and s plies. Total obligations during period, including military pay a allowances, civilian employment, search and development and oth services were about $14.1 billion.

Here is Department of Defens summary of major procurement ob gations for July through Novemb

Materiel & Supplies	Total V
Aircraft	$4,600,000
Ammunition and Guided Missiles	900,000
Engineer Supplies and Equipment	180,000
Clothing and Equipage	220,000
Electronics and Communications	410,000
Petroleum, Oils and Lubricants.	190,000
Ships	165,000
Subsistence	345,000
Tank-Auto	1,060,000
Transportation Equipment	15,000
Weapons	320,000
Other Equipment and Supplies .	590,000
Construction	215,000
GRAND TOTAL	$9,210,000

November obligations partially estimate All figures rounded.

FIRST TURBOPROP TRANSPORT: Undergoing taxi tests in San Diego, Calif., this Convair-Turboliner was built by Consolidated Vultee Aircraft Corp. for the Allison Division of General Motors Corp. It's a research transport purchased by Allison to test its turboprop engines in a modern commercial plane. Two 2750-horsepower Allison 501 turboprop egines are installed in the Turboliner. The planer is a modified 40-passenger, twin-engine Convair-Liner commercial transport, fleets of which are used by domestic and foreign airlines

Fighter Planes De-Mothballed

Pacific Airmotive Corp., Burba Calif., has received an additional der from Air Materiel Command Dayton, O., to de-mothball and re tivate an undisclosed number of F Mustang fighter planes.

The order is in addition to the cently completed F-51 contract ceived in July. The mothballed pla now at Kelly Field, Tex., will

to Burbank by Pacific Airmo-
ilots.

ett Enters Research

rett Corp., Los Angeles, is es-
hing a new division, to be called
earch Mfg. Co. It will build a
nillion plant in Phoenix, Ariz.,
nufacture air turbine refrigera-
id cabin pressure controls.

cations for Scrap

**Ceiling prices considered. Roll-
cks possible. Nation-wide
ol to be created**

ATIONAL iron and steel scrap
will be created under direction
National Production Authority
allocations made to consumers
eded.
vy snowfalls in many areas
disrupted ferrous scrap collec-
n. Reports to NPA indicate that
ventory situation is spotty, but
the overall supply is adequate
aintain full steelmaking and
ry operations, provided distrib-
is equitable.
consumers and dealers in scrap
e asked to report on require-
s and inventories.
A will draft six more men from
crap industry to direct the al-
on program.

ling Prices Coming? — Scrap
steel executives, foundry opera-
and railroad representatives
a two-day conference with of-
s of the Economic Stabilization
cy last week to discuss proper
differentials on ferrous scrap
en cities and between grades.
im is to revise the OPA scrap
ules of World War II and again
em into effect.
ustry men made a strong case
he need of ceiling prices that
l encourage all present collect-
o stay in business and bring
to the market. They pointed
hat only adequate prices would
these collectors in business.

lbacks Possible — Consensus is
open hearth grade prices are
right and that if any price
cks are ordered they will ap-
o certain specialties, including
railroad items.
al decisions on scrap prices
deferred until Jan. 11 when
er conference will be held to de-
ne future policy.

England Petitions for Plant

w England Steel Development
has asked the government for
rity to build a $250 million steel plant at New London, Conn., with an annual capacity set at 1 million tons.

A loan from Reconstruction Finance Corp. would be necessary if a new company would have to be formed to operate the plant. Probably no existing company will touch the New England project now that U. S. Steel and National Steel will build in the East.

Coal for the proposed mill would come from West Virginia and iron ore from Labrador.

SITUATION WELL IN HAND: Standing together at a dinner given by the American Ordnance Association in honor of the U.S. Marine Corps are (left to right): E. R. Godfrey, vice president of General Motors; Louis Polk, president, Sheffield Corp., Dayton, O.; Gen. Clifton B. Cates, U.S. Marine Corps commandant; and Col. James L. Walsh, president of the AOA. General Cates was the principal speaker at the association's dinner at the Waldorf-Astoria in New York. Mr. Polk was elected a member of the technical committees and divisions of the association, effective the first of this year. Mr. Godfrey was elected a member of the national board of directors

Heppenstall Buys Forging Unit

Heppenstall Co., Pittsburgh, has purchased from Harkit Corp. the William Leard Corp's plant in New Brighton, Pa., 33 miles northwest of Pittsburgh. The facility will be used to produce steel forgings.

Heppenstall, a producer of high-quality alloy steels, may eventually convert the plant for specialized production of forged steel alloy disks used in jet aircraft engines and gas turbines.

In that case, several high frequency melting furnaces would be installed, so that the complete disk-production process from original ingot to machined forging could be carried out in the plant.

Munitions Board Reorganizes

Start has been made on the long-expected reorganization of the Munitions Board.

Maj. Gen. Francis H. Griswold is to replace Maj. Gen. P. W. Timberlake as director of the Munitions Board's staff. The latter will be switched to the former's post of deputy chief of staff for materiel, Air Force. Those to remain with the Munitions Board include Rear Adm. Morton L. Ring, director of supply management, and Maj. Gen. J. V. Matejka, director of production management.

M-H Expands in Philadelphia

Minneapolis-Honeywell Regulator Co., through purchase of the three-story Thomas M. Royal plant and 60,000 sq ft of undeveloped land, is starting another expansion of production and operating facilities in Philadelphia, location of its Brown Instruments Division. Brown employment is near 2000, or 20 per cent above the World War II peak. This expansion is the second in less than 2 years, this division having taken on 69,000 sq ft of additional space in May, 1949. Addition of the new building will add 110,000 sq ft.

A Checklist on Controls

GETTING confused by all the regulations, price orders, wage orders, materials orders, amendments, supplements, directions, delegations and notices being issued by the defense agencies? Here is a simplified checklist to help you keep track of the regulations and orders affecting your industry. It lists all those issued to date. Next week and every week thereafter, STEEL's checklist will keep you up to date on government controls.

NPA Regulations

Inventory Controls

REGULATION 1 limits to "a practical minimum working inventory" the quantities of various ferrous and nonferrous metals and minerals, chemicals, building materials, textile materials, rubber materials and forest products that can be ordered, received or delivered. Effective Sept. 18, 1950. NPA Reg. 1.

Interpretations 1, 2 and 3 cover methods of adjusting orders, extent of imported materials exemption, and deliveries of goods through intermediate distributors. Issued Nov. 10, 1950. NPA Reg. 1, Interpretations 1, 2 and 3.

Priorities

REGULATION 2 establishes broad priorities system. Defense Orders (DO) ratings authorized by the Defense Department and Atomic Energy Commission. Rated orders apply not only to prime contractor but are extendable by him to suppliers of materials, products and components used in end item. The regulation sets forth: Basic rules of the priorities system; defines use of ratings; the method of application or extension of ratings; special provisions applicable to rating extensions; rules for acceptance or rejection of rated orders; reporting of improperly rejected orders, cancellation of ratings; sequence of filling rated orders; delivery or performance dates; use and disposition of material acquired under the regulation; intracompany deliveries; inventory restrictions; damage claims; records, reports, audit and inspection; violations; adjustments and exceptions. NPA Reg. 2. Effective Oct. 3, 1950.

Delegation 1 permits Department of Defense to assign DO ratings. NPA Delegation 1 under Regulation 2. Effective Oct. 3, 1950. As amended Nov. 1, 1950, permits Department of Defense to redelegate authority to other government agencies.

Amendment 2 gives the Defense Department authority to issue DO ratings for construction equipment for use in overseas construction projects. NPA Delegation 1, as amended Dec. 29, 1950. Effective Dec. 29, 1950.

Delegation 2 as amended broadens authority of Atomic Energy Commission to permit use of DO ratings for certain plants serving AEC but not owned or operated by that agency. NPA Delegation 2 as amended Nov. 2, 1950.

Delegations 3 and 4 give authority to assign DO ratings to National Advisory Committee for Aeronautics and U. S. Coast Guard. Effective Nov. 8, 1950. NPA Delegations 3 and 4.

Delegation 5 makes Interior Department claimant agency for mining machinery. NPA Delegation 5. Effective Dec. 18, 1950.

Joint Priorities with Canada

REGULATION 3 provides for extension of DO ratings to Canadian firms doing defense work on reciprocal basis. NPA Reg. 3. Effective Nov. 8, 1950.

Materials Orders

STEEL—M-1 sets forth rules for placing, accepting and scheduling orders for steel products that have been assigned a DO rating. It sets lead time for mill scheduling and places ceilings on acceptance of rated orders, based on both product and total tonnage. NPA Order M-1. Effective Oct. 12, 1950.

Amendment 1 provides for scheduled programs for steel for specific purposes. NPA Order M-1, as amended Oct. 26, 1950.

Amendment 2 revises lead time on DO orders for steel. NPA Order M-1, as amended Dec. 1, 1950.

Supplement 1 schedules steel for freight car program. Supp. 1 to M-1. Effective Oct. 26, 1950.

Supplement 2 schedules steel for Great Lakes vessels. Supp. 2 to M-1. Effective Nov. 15, 1950.

Supplement 3 schedules steel for Canadian freight car program. Supp. 3 to M-1. Effective Dec. 15, 1950.

RUBBER—M-2 revises rubber limitation and conservation order. NPA Order M-2. Effective Nov. 1, 1950.

Amendment 1 reduces natural rubber consumption 50 per cent in January and February, 1951, from November, 1950, level. NPA M-2, as amended Dec. 11, 1950. Effective Jan. 1, 1951.

Amendment 2 provides General Services Administration will be sole importer of crude natural rubber or natural rubber latex. NPA Order M-2, Amendment 2. Effective Dec. 29, 1950.

COLUMBIUM BEARING STEEL—M-3 reserves entire production and use of columbium bearing stainless steels for defense needs. NPA Order M-3. Effective Oct. 19, 1950.

CONSTRUCTION—M-4 bans construction for amusement, recreational or entertainment purposes. NPA Order M-4. Effective Oct. 27, 1950.

Amendment 1 clarifies M-4 to permit construction underway to continue. NPA Order M-4 as amended Oct. 31, 1950.

Amendment 2 extends ban on amusement construction. NPA Order M-4, as amended Nov. 15, 1950.

ALUMINUM—M-5 establishes rules for handling DO ratings for aluminum. Provides ceilings for acceptance of rated orders. NPA Order M-5. Effective Oct. 27, 1950.

STEEL WAREHOUSES — M-6 establishes quotas for steel deliveries to warehouses, based on average monthly shipments during first nine months of 1950. Provides ceilings on DO rated orders warehouses are required to accept. NPA Order M-6. Effective Nov. 8, 1950.

Amendment 1 requires record keeping by producers and distributors. NPA Order M-6, as amended Dec. 1, 1950.

Amendment 2 allocates steel to Canadian warehouses. NPA Order M-6, as amended Dec. 15, 1950.

ALUMINUM — M-7 limits nondefense use of aluminum to 65 per cent of average used in first half of 1951. It limits inventories to 60 days' supply or practical minimum working inventory, whichever is lower. Reductions became effective Jan. 1, 1951. NPA Order M-7. Effective Nov. 13, 1950.

Amendment 1 eases restriction on nonrated aluminum use to 80 per cent in January and to 75 per cent in February. NPA Order M-7, as amended Dec. 1, 1950.

Direction 1 permits automatic adjustment in aluminum use in December. Dir. 1 to NPA Order M-7. Effective Nov. 28, 1950.

Direction 2 permits automatic adjustments in aluminum use in certain cases during first quarter of 1951. Dir. 2 to NPA Order M-7. Effective Dec. 16, 1950.

Direction 3 permits increase to 75 per cent of the amount of aluminum that can be used in manufacture of structural functional component parts during March. Dir. 3 to NPA Order M-7. Effective Dec. 27, 1950.

-M-8 tightens inventory controls . It establishes rules for reporting cks, receipts, consumption and dis- ion. NPA Order M-8. Effective 13, 1950.

endment 1 schedules nonrated use . NPA Order M-8, as amended 18, 1950.

—M-9 establishes rules for accept- d scheduling defense rated orders nc. Provides 30-day lead time and gs for acceptance of DO ratings. Order M-9. Effective Dec. 1, 1950.

ALT—M-10 establishes cobalt in- ry control and directs distribution ports. NPA Order M-10. Effec- Nov. 30, 1950.

endment 1 provides virtually com- allocation of all forms of cobalt. ning Feb. 1, 1951, every purchase ore than 25 pounds will require approval. NPA Order M-10, as ded Dec. 30, 1950. Effective Dec. 50.

ER, COPPER-BASE ALLOYS— schedules DO rated orders for cop- d alloys, establishes lead time for ting defense orders and provides gs for defense orders. NPA Order . Effective Nov. 29, 1950.

ER, COPPER PRODUCTS—M- its copper use in nondefense work per cent in January and February o 80 per cent in March to average in first half 1950. Foundry prod- allowed 100 per cent. NPA Order . Effective Nov. 29, 1950.

endment 1 restricts use of copper de range of end products starting 1. It permits use of copper where ves a functional purpose or where tisfactory substitute can be used. e amendment is a list of articles in no copper can be used, including in these categories: Builders' hard- building materials, burial equip- , clothing and dress accessories, fur- e and fixtures, hardware, home fur- ngs and equipment, household ap- es, jewelry, gifts and novelties, mo- vehicles, passenger transportation ment and miscellaneous articles. Order M-12, Amend. 1. Effective 30, 1950.

H TENACITY RAYON YARN— ules DO ratings. NPA Order M- Effective Dec. 1, 1950.

KEL—M-14 limits nonrated use of ry nickel during first quarter, 1951, per cent of average during first 1950. Maintenance, repair and op- g supplies to continue at 100 per cent. NPA Order M-14. Effective Dec. 1, 1950.

ZINC — M-15 limits nondefense consumption of zinc starting in January to 80 per cent of average used in first half of 1950. Limits inventories to 45-day supply or practical minimum working inventory, whichever is lower. NPA Order M-15. Effective Dec. 1, 1950.

COPPER SCRAP—M-16 provides for maintaining distributive channels for copper scrap. NPA Order M-16. Effective Jan. 1, 1951.

ELECTRICAL COMPONENTS—M-17 spreads DO-rated orders for certain electrical components. NPA Order M-17. Effective Dec. 18, 1950.

HOG BRISTLES—NPA Order M-18. Effective Dec. 21, 1950.

CADMIUM—M-19 limits use of cadmium and restricts inventories to 30-day supply. NPA Order M-19. Effective Jan. 1, 1951.

Price Regulations

NEW AUTOMOBILES—Regulation 1 freezes prices on new passenger cars at Dec. 1, 1950, levels until Mar. 1, 1951. ESA Ceiling Price Reg. 1. Effective Dec. 18, 1950.

Wage Regulations

NEW AUTOMOBILES—Regulation 1 stabilizes wages and salaries in the new passenger automobile manufacturing industry to Mar. 1, 1951. ESA Wage Stabilization Reg. 1. Effective Dec. 22, 1950.

Wage Procedural Regulations

WAGE INCREASES—Regulation 1 delineates procedures by which interested parties—employers, employees or labor unions—may file petitions for wage increases and the steps toward reaching decision on petition. ESA Wage Procedural Reg. 1. Effective Dec. 22.

Notices

HOARDING—Notice 1 issues list of materials subject to antihoarding provisions of the Defense Production Act of 1950. Included are most metals, many other materials. NPA Notice 1. Effective Dec. 27, 1950.

Want complete copies of these regulations and orders?

For NPA orders, write to United States Department of Commerce, Division of Printing Services, attention E. E. Vivian, Room 6225, Commerce Bldg., Washington 25.

For ESA orders, write J. L. Miller, Economic Stabilization Agency, Room H367, Temp. E Bldg., Washington 25. Identify orders by numbers as listed in this index.

Steel Needs Mount

Direct defense to take two million tons in first half. Tighter controls coming

LOOK for direct defense requirements to mount steadily this year. This will require review and revision of the present priority system. New orders will be issued. Existing ones will be revised.

An example of the increases to be expected is that in steel. Military and defense people now say that direct defense requirements will be at least two million tons in the first half of 1951. A few weeks ago they were figuring on only a million and a half.

More for Military—The M-1 order (steel) is being revised. More steel will be reserved for the military and that, of course, will make less available to nonrated consumers.

The tightening supply situation is reviving talk of earlier adoption of a controlled materials plan. Defense officials blow hot and blow cold on CMP alternately. Many believe it will be impossible to launch a full-fledged CMP before midyear; others think a modified CMP should be placed in effect as soon as possible.

MRO—A move is under way in NPA to establish a priority rating under which the manufacturers of products and services required for MRO (maintenance, repair and operation) of defense and essential civilian industries will be enabled to obtain the materials they need. So far these industries, by shopping diligently, have been able to get MRO requirements but the situation rapidly is getting more difficult as a result of the end-use limitations on aluminum, copper, tin and zinc. The MRO order should be out within three weeks.

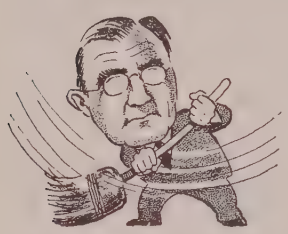
Copper Price Holds—Economic Stabilization Agency, in a meeting with copper industry representatives, found that price of primary copper is relatively stable and received assurances that members of industry will not advance their prices without first notifying ESA. Administrator Valentine says no ceiling prices would be placed on copper at this time.

McManus: DPA Administrator

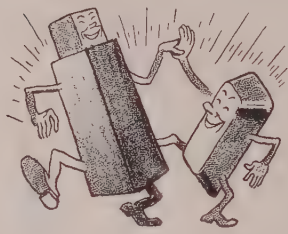
Clifford B. McManus, president of the Georgia Power Co. and the Southern Co., who went on leave from these posts Sept. 19 to assist Interior Secretary Oscar L. Chapman in the formation of the Defense Power Administration, was appointed DPA administrator.

Windows of Washington

By E. C. KREUTZBERG *Washington Editor, STEEL*

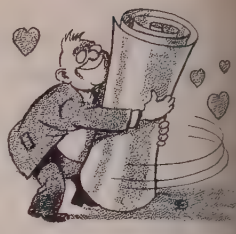


Wilson Clears the Way



Happy About "Jebby"

Press Staff on Beam



A Law Business Will Like

TWO SETS of decisions of vital concern to business are in the making in Washington—one by Congress and the other by Defense Mobilizer Charles E. Wilson. From them will stem the coming controls over materials, prices and wages.

Mr. Wilson is overhauling the procurement organization and procedure in the armed services to get much faster action in placing contracts. In June, before we moved into Korea, military spending was at $12 billions a year. In December it was $18.5 billions a year. That, in Mr. Wilson's opinion, was not good enough. He wants contracts placed by negotiation whenever that will result in getting new production lines tooled up faster and in operation.

He has placed Gen. William Henry Harrison in charge of the newly-created Defense Production Administration. General Harrison's former position as chief of the National Production Authority will be filled later by Secretary of Commerce Sawyer. The DPA will direct NPA, defense transportation and several agencies of the Interior Department concerned with defense minerals and metals.

With the reshuffling of powers, virtually all materials essential to defense, except food, fall under General Harrison's office. The Department of Agriculture retains control of food, answering to Mr. Wilson.

General Harrison now has all the powers over priorities, allocations of materials, requisitioning, loans, purchasing and certification of accelerated tax amortization, previously vested in other agencies. With the revised lineup, the DPA will function in much the same way the War Production Board functioned during World War II.

'Jebby' Goes Back to Oregon . . .

Resignation of C. Girard Davidson —known as "Jebby"—as assistant interior secretary removes from the government one of the principal needlers of business. In 1946 and 1947 he spoke all over the country in condemnation of the iron and steel industry for being slow about expanding ingot capacity to the 110-million ton level which then was his goal.

When STEEL asked him if he was making due allowance for all the bottlenecks—in iron ore, lake carrier fleet, handling facilities, etc.—that would have to be remedied, he said yes, he realized all that, but he realized further that the whole program he had in mind represented a lot of work, employment and prosperity.

A likeable man, and normally a friendly one, Mr. Davidson is going back to his birthplace, Portland, Ore., to practice law—and possibly to spade the way for the next Democratic nomination for the Senate.

The President's Press Staff . . .

More emphasis on news of business significance should result from the reorganization of President Truman's press staff.

The new presidential press secretary, Joseph Short, former White House correspondent for the *Baltimore Sun,* chose as his principal aides two men familiar with business problems—Irving Perlmeter and Roger W. Tubby.

The former was information officer of the Bureau of Internal Revenue since 1943 and is thoroughly familiar with all policies coming under the head of taxation. Mr. Tubby is familiar with our foreign business interests: He served, as information officer for the old Foreign Economic Administration, the Office of International Trade and, since 1946, the State Department, for which he has attended all international conferences on reciprocal trade agreements.

An Allout Renegotiation Law . . .

Business opposition to enactment of a new allout renegotiation law is noteworthy by its absence. Washington business representatives will confine their efforts largely to perfecting the language of the bill in the interest of clarity. "Renegotiation has served a real purpose in relieving business of accusations of profiteering," one interested part told STEEL, "and all that we wan is a good law." The Vinson bill, H. R 9564, now before the Ways & Mean Committee, would apply renegotia tion to all military buying regardles of amount of money involved an whether contracts were placed by n gotiation or advertising. It woul apply also to procurement of th GSA, RFC and any other agencie designated by the President.

Renegotiation under the 1948 la is in full swing. Contractors an subcontractors should bear in mi that the law calls on them to tak the initiative in such proceedings.

Contractors should also ascerta whether any of their business is su ject to renegotiation. In identifyin business that is subject to renegoti tion they will be helped by studyin the lists of such contracts and su contracts available from the Superi tendent of Documents, Governme Printing Office, Washington 25, supplements to the Military Reneg tiation Regulations.

Hearings on Shortages . . .

First full-dress hearings of the n 82nd Congress will examine shortag of critical and strategic materi and ascertain what is being done alleviate them. They will be held the Senate's Small Business Co mittee—Sen. John Sparkman (Dem Ala.), chairman—beginning Jan.

Steel will be considered on Jan. copper and zinc on Jan. 19 and a minum on Jan. 22.

More Preprints Available . . .

Preprints of another chapter the Bureau of Mines Minerals Ye book for 1949 have been made avai able; it is entitled "Slag—Iron Bl Furnace" and is replete with stat tics on production and end-use blast furnace slag. Copies are obta able at 5 cents from the Super tendent of Documents, Governm Printing Office, Washington 25.

volution in ECA and Point Four

Point Four becomes a reality in Brazil. ECA shifts its emphasis to raw material development programs. A Marshall Plan for southeast Asia also shapes up

EVOLUTION in progress in rica's ECA and Point Four pro- 's is picking up speed as inter- nal events remain ominous.

Pnt Four is becoming a reality; a l will be the first South Amer- country to spur its economic and trial development under the plan. only is ECA pulling out of Brit- but it is shifting emphasis on kind of projects it will still en- in the countries where it yet stakes. Raw material develop- programs are more apt to get val now than at anytime since arshall Plan was proposed. ECA o laying the groundwork for a r program in Southeast Asia.

ngs To Come—Late last year spent $30.3 million, primarily tablishing and setting up mis- in Formosa, Thailand, Indonesia, a and the Indo-China states. In ion U. S. experts have gone to Philippines to aid that country eting its initial commitments un- the preliminary aid agreement d in November. Another $4.5 n has gone to India to ease the ie.

e Southeast Asia area program authorized June 5, 1950, and is being implemented. In the next six months, Thailand is expected to get $8 million; Indonesia $13 million; Burma $8 to $10 million; Indo-China $21.4 million; and Formosa $40 million.

Brazil Joins Point Four Fold

Brazil and the U. S. have agreed on technical co-operation under the Point Four program. A subsidiary agreement establishes a Joint Commission for Economic Development to assist Brazil in planning and carrying out an economic development program. It will be composed of a Brazilian and American commissioner and will be located in Rio de Janeiro. Its main job will be to study needs of Brazil and to recommend action.

Three subcommissions on transportation, power development and food and agriculture will advise and assist the commission. The U. S. has allocated $800,000 of Point Four funds to Brazil during the current fiscal year for new projects, of which about 60 per cent may be used for immediate studies on transportation and power.

The production of power is insufficient for Brazil's present needs. One problem is financing of proposed expansions. The power subcommission will study the possibilities of necessary foreign capital participation.

As part of the co-operation between the two countries, existing joint projects in Brazil will be expanded under the Point Four program. One of these is a geological survey by the U. S. Department of Interior. Since 1940 American geologists have been working with Brazilians surveying some of the nation's valuable mineral resources. Those investigations verify the existence of the two largest deposits of high-grade manganese known in the Western Hemisphere.

One of these, in the territory of Amapa, near the mouth of the Amazon, is estimated to contain at least 7 million tons of ore. The other, in the state of Mato Grosso, near the Bolivian border, contains an estimated 33 million tons of ore. Bethlehem Steel Co. is negotiating with Brazilian interests for the development of the manganese in Amapa and U. S. Steel is negotiating with other interests for developing the Morro do Urucum deposit in Mato Grosso.

American geologists are continuing to help to determine how much iron ore is in a mountain range at Itabira in the state of Minas Geraes. The deposit is believed to be one of the largest sources of high-grade iron ore in the world.

German Mine Gets ECA Help

One of Germany's largest lead and zinc ore producing areas, mined as early as the 13th century, will be further developed with the aid of Marshall Plan counterpart funds. ECA will advance the equivalent of $473,812 to Stolberger Zinc Mining & Smelting Corp. in Maubach to boost output of those strategic metals.

The firm will repay ECA in five years in shipments of lead and/or zinc to the U. S. stockpile. Deliveries will begin this year. The project will enable Germany to expand her lead exports to other Marshall Plan countries and will reduce her zinc imports from hard currency areas. Average grade of Maubach is 3 per cent lead and 2 per cent zinc.

The lead and zinc deposits total an estimated 28 million tons. Initially, the company will produce at the rate of 440 tons of ore per day, yielding more than 1600 tons of lead and 1100 tons of zinc per year.

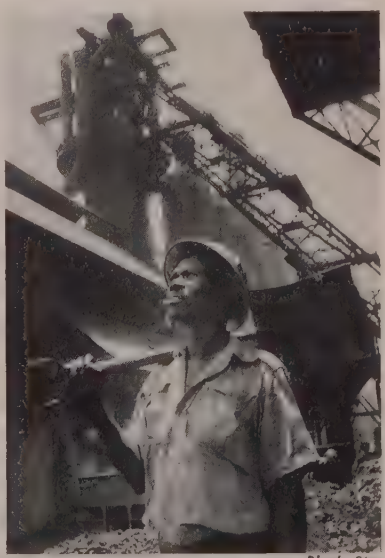
Bethlehem Starts Ore Shipments

Bethlehem Steel Co. will begin ore shipments from Venezuela this month.

The company's development, handled through its subsidiary, Iron Mines Co. of Venezuela, involves a block of 16 iron ore concessions. Beth-

Black Star

LUTION IN SOUTH AFRICA: The works at Pretoria (Iscor) were built re World War I with German ma- ery. The foundation for another furnace is shown. The first (back- nd) was blown in last summer . . .



Black Star

. . . Ore for the South African steelworks is transported from the mines located in North Transvaal. Coal comes from Newcastle, England. Looking over things is a Negro bossboy. Behind him is the first blast furnace

lehem's investment in the project will ultimately total $50 million. An annual yield of about 2.5 million net tons of ore is expected eventually from the El Pao mines located about 30 miles south of San Felix, near the confluence of the Orinoco and Caroni rivers, about 165 miles from where the Orinoco empties into the Atlantic.

Initially, the open-pit method of mining will be employed. At the pit electric shovels of four-cubic-yard capacity will load the ore into 30-ton diesel engine trucks which will haul it to the crushing plant. The ore mined at El Pao mines will be shipped by rail to Palua, a port on the Orinoco near San Felix. A 36-mile railroad and an improved highway connect the mine and the port of Palua.

The ore will be loaded into river boats and barges from a conveyor belt which is supported on a steel cantilever structure overhanging the river. From the river site the ore will be taken to Puerto Hiero, the tidewater port on the Gulf of Paria, across from Trinidad. There it will be loaded into ocean-going ore carriers for shipment to the U. S.

Salem, Brosius Merge

The combined organization will be known as Salem-Brosius Inc.

SALEM Engineering Co., Salem, O., and Edgar E. Brosius Co., Pittsburgh, are now one: The combined organization will be known as Salem-Brosius Inc. Both will continue to use their individual company identifications with no changes being made in the personnel. Ward A. Wickwire Sr., Brosius president, and Sam Keener, Salem president, divulged no details.

Design and manufacture of special machinery for the metal industries has been the forte of Brosius, founded in 1909. It also manufactures blast furnace accessories and materials handling equipment for blast furnaces and industrial heating and melting furnaces. World wide activities are conducted through licensees in most foreign countries.

Founded in 1934, Salem Engineering has a staff of design consultants and construction engineers specializing in industrial furnaces and steel mill equipment. Associated companies in Canada and England and licensees and representatives conduct its activities throughout the world. The associated companies are involved in the merger, which will make Brosius production facilities available for fabrication of equipment designed by both companies.

ONE DOWN, THREE TO GO: That's the score at Columbia Steel's Torrance, Calif., plant where the smog problem is rapidly being eliminated. By installing an electrostatic precipitator on the outlets of each of the open-hearth furnaces smog can be completely done away with. No smoke can be seen emanating from the second stack from the left. At its base is an electrostatic precipitator 60 feet high. Construction is underway on precipitators for the other stacks

The Skies Are Clearing Over L.A.

Air pollution in Los Angeles has been reduced 35 per cent since April, 1948, says Gordon P. Larson, county pollution control director. Since 1948 installation of smog abatement equipment totaling $3,924,500 has been made in Los Angeles industrial plants. Typical of the equipment being installed by Los Angeles steel producers is Columbia Steel Corp.'s $600,000 electrostatic precipitator, first of a total of four to be installed. The precipitator, 60 feet high, diverts exhaust gases from the open-hearths to a ventilated branch flue system leading to a cleaning system. The cleaned gas leaving the precipitator is 96 per cent cleaner than before entering the new air pollution equipment.

Opens LP Gas Facilities

Socony-Vacuum Oil Co., Inc. expects to open a new plant at South Norwalk, Conn., for filling and distributing liquefied petroleum gas. It will service dealers in Connecticut, Rhode Island, southern Massachusetts and southeastern New York, now being served by the company's refinery in Paulsboro, N. J. Building will have facilities for deicing, painting and filling the bottles. Gas will be delivered t the new plant by tank car.

Oil Gas Patent Granted

Gas Machinery Co., Cleveland, w granted a patent relating to the pr duction of oil gas, using various typ of process oil and with oil as fuel f heating. It is said to cover the bas process for the production of oil g by present day methods.

The process differs from simil processes in the extent of crackii that takes place. Temperature and action time are such that the g produced has a higher heating val Known as the high Btu oil gas pr ess, it uses equipment resembling th used for water gas production, though the process is entirely d ferent. Processes coming within t scope of the patent have been stalled and are being installed a licensed by the company under patent, No. 2,522,922.

Delta Star Goes to Porter

H. K. Porter Co. Inc., Pittsbur acquired Delta Star Electric Co., C cago, manufacturer of high volt equipment for control and transm sion of electricity around central po er stations, and transformers. The dition of Delta and of Quaker Rub Corp. and Connors Steel Co. gi Porter another line to add to its r ber, steel and oil field business.

Lockheed Sales Up 44 Per C

Lockheed Aircraft Corp., Burba Calif., is experiencing the largest sa volume since the war years. Rol E. Gross, Lockheed president, s the 1950 figure, expected to re $170 million, will be 44 per c higher than the 1949 total of $1 667,000.

A backlog of unfilled orders government letters of intent is largest since the end of World II—$425 million. The backlog ported at this time last year was million. Employment, too, has a gain, now being up 11 per from a year ago to 18,500. A pea about 21,000 employees is expe to be reached at the end of this y

Douglas Negotiates for Plant

Negotiations are in progress am Douglas Aircraft Co., Santa M ca, Calif., and the Air Force Boeing Airplane Co., Seattle, W for the use of a government airfr plant in Tulsa, Okla., to be use the manufacture of B-47 bom An Air Force spokesman, in sa that details are being worked stated that it would be at lea

s before Douglas could get into tion on this plane.
h is the first time since the end rld War II that any Boeing-de- planes have been produced by pany other than the designer. Tulsa plant was used during War II by Douglas.

ian Enters New Field

purchasing the tractor accessor- erations of Isaacson Iron Works, e, Wash., Pullman-Standard Car Co., Chicago, enters the trac- lied equipment field. Champ Pullman president says Isaac- Seattle operations will be trans- to the Hammond, Ind., plant company. The newly acquired ny also maintained a plant in ord, Ill. Bulldozers, scrapers, s, hydraulic power units, winch- other equipment used mainly in rth moving field were made by on. The company does not make s.

netic Rubber Plant Reopens

dyear Tire & Rubber Co., Akron, ill reactivate a government- synthetic rubber plant. It will increase the nation's supply of the critical material by some 55 million pounds in 1951. The company has 18 of the plant's 34 polymerizers in production and will follow with the remainder in February. First month's output should approximate 200,000 pounds. It was ordered reactivated in September by the Office of Rubber Reserve and will be operated by the Goodyear Synthetic Rubber Corp. It was necessary to replace considerable equipment which had been disposed of through the War Assets Administration following the government decision to cease operations in 1947. A changeover from dry rubber originally produced to latex, or liquid rubber, was also required.

8 Per Cent Defense at Koppers

With only 8 per cent of its present backlog of orders attributable to direct orders for military goods, Koppers Co. Inc., Pittsburgh, is entering 1951 with facilities geared to produce at high levels, not only for civilian needs but for whatever work of a national defense nature it is called upon to perform. So says Gen. Brehon Somervell, Koppers' president.

In 1950 the Engineering and Construction Division of the company completed and placed in operation nine coke batteries, comprising 448 ovens in the United States and one battery of 57 ovens in Chile. The domestic ovens alone are capable of producing enough coke to make nearly 3.5 million tons of pig iron.

Firm Awarded Half Billion Job

When F. H. McGraw & Co., Hartford, Conn., starts construction of a gaseous diffusion plant for the Atomic Energy Commission at Paducah, Ky., it will be beginning a $500 million job. The plant is to be built on a 6000 acre site and will produce U-235 for weapons and power plants.

To Build Small Motor Plant

Union City, Ind., will be the site of a Westinghouse Electric Corp. plant for the production of small electric motors. To be a modern one-story structure containing both manufacturing and office space, the new facility is expected to employ about 500 men and women when operations commence late in 1951.

Increased demand for fractional horsepower motors arising from defense program and increased building of industrial plants is making necessary the production of additional numbers of this type of motor, the company states. Plans for expansion of the company's Small Motor Division in Lima, O., call for leasing of two buildings, totaling 120,000 sq ft of floor space. These structures will be devoted to production of machined parts for the Lima plant and to office and storage use.

Mg Plants Reactivated

Government-owned magnesium plants held in the National Industrial Reserve are being reactivated, says Jess Larson, administrator of general services. The three plants which will make about 112 million pounds of magnesium available for stockpiling during the next 2 years are to be operated by: Diamond Magnesium Corp. at Painesville, O.; and two plants by Nelco Metals Inc., at Adams, Mass., and Wingdale, N. Y.

Rheem Steel Plant Purchased

National Radiator Co., Johnstown, Pa., has completed arrangements to purchase the Danville, Pa., steel plant of Rheem Mfg. Co., says the General Services Administration. National will take over the plant from Webrib Steel Co., Danville, this company having purchased the plant in 1947 from the War Assets Administration.

to Story: 50 Years of Drilling

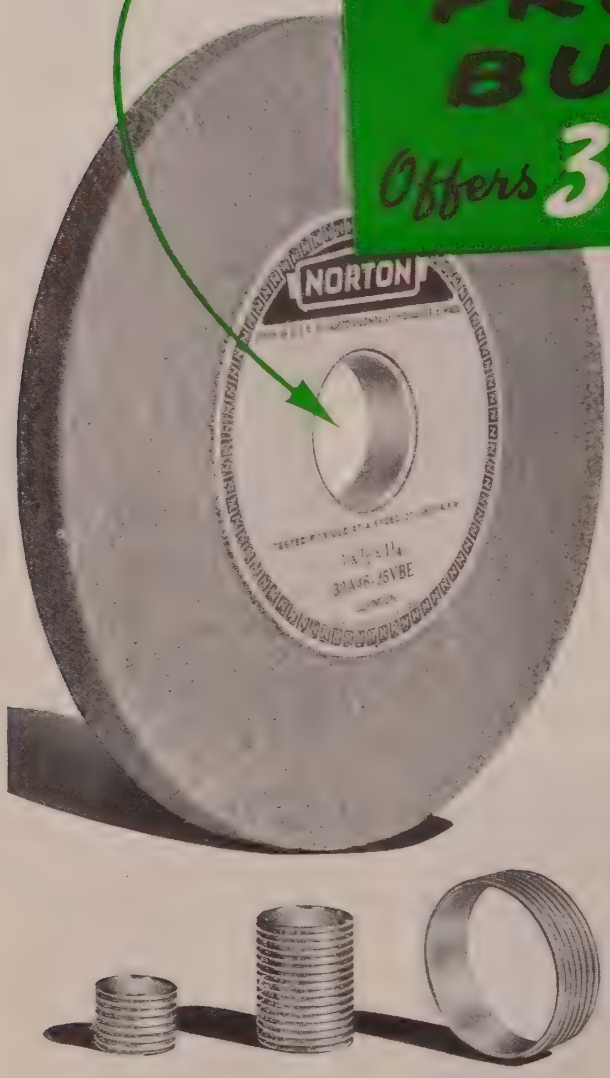
WHERE between the bicycle automobile ages were the be- gs of multiple spindle drilling. earliest attempts at this form ling and tapping were made pos- by a cash register, a side plate 1901 model being drilled and d by the first multiple spindle riller and tapper. In that year, en from the National Cash Reg- Co., Dayton, O., developed a new of drilling machine with several es; they formed a new company his year is celebrating its 50th ersary — National Automatic Co. Inc. First located in the floor of a downtown Dayton ing, the company occupied 3500 of floor space. To ship a ma- it was necessary to remove an window frame from the side of uilding to lower it to a big it wagon below.

n1910 the plant moved to larger ers in Richmond, Ind., its pres- cation. In succeeding years the any introduced independent e of speed for each spindle, pindle plates, the rotating table, ple tapping with individual lead s to each tap and hydraulic to its machines.

sident of Natco is Harry Bock- who succeeded his father in 1928. company added floor space in and is now completing new building that will provide for engineering and welding expansion. The entire plant will include 254,000 square feet of floor space. It's a far cry from the third floor factory of half a century ago.

ACCURACY FOR THE PAYOFF: This is one of the new machines that National Cash Register Co., Dayton, O., uses for machine drilling and step reaming of cash register key frames. Accuracy is to 0.001-inch

NEW! NORTON PRECISION BUSHING* Offers 3 Important Advantages



The new Norton-developed precision bushing is the latest step in the continuous Norton program to give you better grinding wheels—an important step in which was the opening of the new Norton grinding wheel plant two years ago.

1. IMPROVES WHEEL BALANCE

You get new standards of balance in every wheel produced in the new Norton plant. And the precision construction of this aluminum bushing preserves for you every bit of the improved balance molded into the wheel—thus bringing to you *all* the improved performance that comes from better wheel balance.

2. HAS MORE UNIFORM HOLE SIZE

This new Norton bushing gives you precision arbor fits because precision manufacture holds its hole size to closer tolerances than ever before achieved in any other grinding wheel bushing.

3. STRENGTHENS HOLDING POWER

The fluted construction on the outside of each Norton precision bushing *plus* the method of press-fitting it into the wheel give you double assurance of a firm grip, even in fine grit wheels.

AVAILABILITY—The new Norton precision bushing is now being used in straight wheels 5″ to 8″ diameter. Its use will be extended to other wheel shapes and sizes as rapidly as possible. Keep in touch with your Norton distributor for the latest news.

* PATENTED—ANOTHER EXCLUSIVE NORTON FEATURE

Making better products to make other products better

NORTON COMPANY, WORCESTER 6, MASS.

Warehouses in Five Cities — Plants in Six Countries
Distributors in All Principal Cities

NORTON
ABRASIVES

C. TUTTLE *Detroit Editor, STEEL*

Mirrors of Motordom

GM is showing the public a new futuristic car, Le Sabre, which may give hints of what the automobile years hence will look like. It has a gasoline-alcohol fuel system

DETROIT

DREAMERS in the auto indus- e giving reality to some of their s. GM has just come out with uristic car, "Le Sabre."

n't discount the vehicle as wildly ctical for in 1938 Buick built first advance car. It had es now common in many s. Buick's "Y job" was the American-styled car on public y with electrically controlled rtible top and door windows, utton door latches inside and ender extensions into the doors, amps recessed in the rear fen- and a lower vertical grille.

olution to Metal—Le Sabre, bet- nown around GM shops and labs P8, is a sports two-seater. It's only a full-sized plaster model, t will be built in metal in the two months.

Sabre will be powered by an imental V-8 engine with 10-to-1 ression ratio plus supercharger. fuel system will use premium ine and methyl alcohol, the latter injected into the combustion bers through the carburetor for power boosts. This engine, now tested by Buick, is expected velop more than 300 horsepower supercharger. Stroke and bore 3¼ by 3¼ inches. Piston dis- ment is 215 cubic inches.

nferrous Uses—Head and cylin- lock are of cast aluminum alloy. der walls are lined with a special resistant cast iron and the com- on chambers in the head are ined, not cast. The head also stainless steel valve seat inserts. heel is of high tensile bronze. e guides also are of bronze. In- valves are made of nickel ne alloy steel and the exhaust s are sodium cooled. Pistons are e of aluminum alloy.

eight of the engine is 500 pounds, pared to 750 pounds for the Buick lmaster engine. Total weight of ar will be about 3000 pounds, the ness resulting from wide use of -treated magnesium and alumi- alloys in the body and engine.

vel Arrangements—A special dy- w torque converter is housed ahead of the differential. Rear es are not on the wheels, but either side of the differential. Axles mount twin universal joints. Because Le Sabre's wheels are below conventional size, brake drum diameter is limited to nine inches. In compensation, the brake drums are of twin-shoe type to provide necessary braking surface.

A special anti-dive feature is built into the independent front suspension, and the rear wheels are also independently suspended, with the differential stationary.

The body, presenting lines similar to a jet plane, is 36¼ inches high at the cowl, 50 inches with top raised. Low profile notwithstanding, road clearance of six inches is provided. Wheelbase is 115 inches and overall length 200 inches. Overall width is 76½ inches.

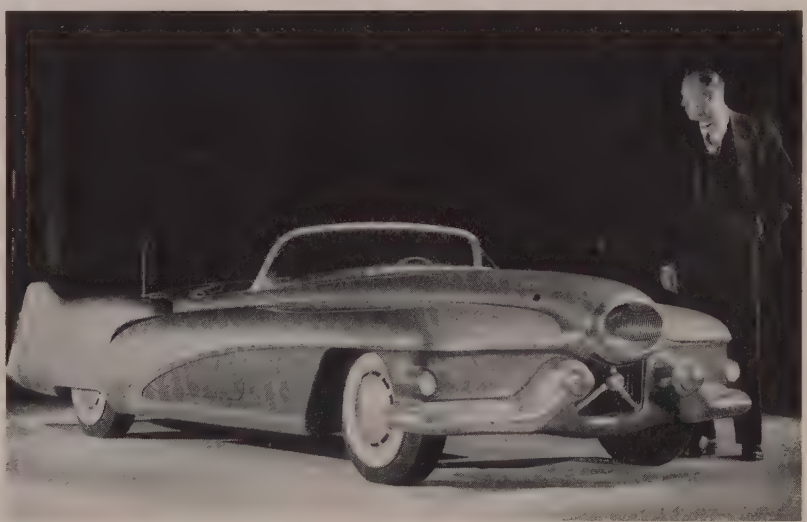
Style Shifts—Among the styling features are twin tail fins each of which houses a 2-gallon rubberized fuel cell, one for gas, the other for methyl alcohol. The jet-type tail cone has functional use, although not that of the planes after which it was patterned. Stoplight is housed in it and the spinner hub serves as rear bumper. Tail lights, directional signals and backup lights are mounted vertically on the trailing edge of the tail fins.

The grille-like "intake scoop" at the nose is a fooler. It revolves to disclose a pair of close set headlights. Fixed running lights are at the outer extremity of the front fenders.

Below the headlight assembly is the radiator air intake. The aluminum radiator core is protected by an inverted Y bar, lines of which are picked up by the massive bumper which mounts bulletnosed spinners.

More Air—To provide ventilation for the rear brakes and for a supplemental 12-volt battery powering Le Sabre's many electrical devices, air scoops are located at the curve of the rear fenders.

The cockpit is a gadgeteer's delight. In addition to the usual gages, such things as tachometer, compass and altimeter are built in. A useful feature should be the built-in torque converter, fluid level and temperature gage. Controlled from the instrument panel are built-in hydraulic jacks for each wheel. All doors and windows are electrically controlled, but also function mechanically in case of battery failure—heaven forbid. In addition to a warm air circulating system the seats are electrically heated. The electrically operated convertible top has at least one thoroughly desirable feature . . . it raises when



THOSE SWEEPING LINES: Harley J. Earl, General Motors vice president in charge of styling, looks over the full-scale model of Le Sabre, a custom-built sports car that will be a laboratory on wheels for testing advanced design and mechanical features when completed. In development for the last four years, Le Sabre utilizes lightweight aluminum and magnesium alloys in its body and engine construction and incorporates the lines of a jet

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rain hits a sensitized spot between the seats.

Not Practical—General Motors' vice president in charge of styling, Harley J. Earl, makes no predictions as to what features of the car may sometime appear in production models. The front bumper line already bears similarity to the new Cadillac, and the flossy side trim looks like a continuation of the Buick sweep spear. Mr. Earl points out that many of the materials used in Le Sabre make it completely "untouchable" from a cost standpoint for production cars. But "if the time comes when some materials or some devices . . . get within range of the customer's pocketbook, we'll be ready."

New Kaiser Introduced

A somewhat less fanciful car has been placed in production by Kaiser-Frazer. The custom-styled Kaiser, tagged the "Golden Dragon" series, appears first as a four-door sedan, but will be offered later in two-door and club coupe models. The name comes from the brilliant body color combinations and the use of alligator-patterned vinyl upholstery. This leather-like material is used in the padded dash panel, seats, door panels and rear window shelf. Solid color vinyl plastic is used for headlining, scuff panels and other trim. Interior colors are scarlet, Caribbean coral, tropical green, black, Indian ceramic and Burma brown. Two-tone body paint combinations feature Cape Verde green, Indian ceramic, Caribbean coral, mineral gray, garden green, marine gray and aloha green. The new series is being assembled at Jackson, Mich., Long Beach, Calif., and Willow Run.

Vendors Hard Hit by Prices

Vendors to the industry indirectly got just as hard a punch in the nose by ESA's initial price regulation as did the auto companies, although the hullabaloo about it has been much less public.

Virtually every part and material the industry needs to build cars is costing more to produce than it did a few months ago. Labor cost is up at most plants or soon will be. Some parts suppliers who advanced prices on Dec. 1 believe they need another increase now, but their Detroit representatives are burning up the long distance wires telling the home offices the industry won't stand for it.

More Money for Suggestions

Inflation Note—$2500 is now the top award under the General Motors employee suggestion plan. Minimum award is upped from $7.50 to $10. The top figure, payable in U. S. Savings Bonds, had previously been $1000. In the nine-year operation of the system 728 top awards have been made. In all $5,740,000 has been paid out.

Auto Truck Output

U. S. and Canada

	1950	1949
January	609,882	445,092
February	505,593	443,734
March	610,678	543,711
April	585,705	569,728
May	732,161	508,101
June	897,856	623,689
July	746,771	604,351
August	842,304	678,092
September	760,808	657,073
October	795,918	601,021
November	633,678*	475,454
December	650,000*	384,318

Weekly Estimates

Week Ended	1950	1949
Dec. 9	162,757	52,514
Dec. 16	169,480	86,226
Dec. 23	160,912	116,567
Dec. 30	130,200	113,026
Jan. 6	120,000	116,768

Estimates by Ward's Automotive Reports

* Preliminary.

How Many Cars in 1951?

While the industry's publicity men were grinding out declamations on the herculean task their respective companies performed in 1950, another group of writers sat down to have lunch and to play a guessing game. The Automobile Manufacturers Association at yearend gets automotive and technical writers together on the promise that the best predicter of the following year's car and truck production will get a new hat at the next annual get-together. Presumably if a guesser comes close, he needs a new hat to fit his swollen head. The guestimates ranged from a high of 5.8 million cars and 1.6 million trucks, to a low of two million cars, 450,000 trucks. By throwing out several of the top and bottom guesses in accordance with the best devious logic of statisticians, AMA told the newsmen-turned-crystal-ball-gazers their collective belief is that 3,395,000 cars and 908,000 non-military trucks and busses will be produced in 1951.

One man who might be expected to have ideas on 1951 output is Joseph E. Bayne, Lincoln-Mercury general sales manager. Speaking to a group of Cincinnati dealers recently, he said that a prediction even within a million units for the year's automobile production "is impossible." He said that most manufacturers would hesitate to say which material shortage might have the greatest effect. Steel being vital, that material was discussed first. In January, he said, it has been estimated car production schedules may be 25-30 per cent lower because of steel shortages. Shortages also loom in most of the remaining 30 auto components.

Studebaker Cuts Back

One automotive casualty from the restrictions on civilian use of critical materials is Studebaker Corp. A 20 per cent reduction in passenger car output has been scheduled this month. The South Bend facility went on a four-day week for cars. Civilian truck production cutbacks were largely offset by military truck output. Five Buick-Oldsmobile-Pontiac assembly division plants across the country also ran into a "sudden acute shortage of materials" and were forced to close down. Full-scale operations, however, resume today. Packard began a 20 per cent cutback in production as the year started, laying off about 1800 workers. Nash is laying off about 4500 employees, curtailing output of cars and appliances about 20 per cent. Night shift was "premanently abolished" at the Lincoln-Mercury Metuchen, N. J., plant and 1000 workers were laid off.

Now Chrysler, too, is planning cutbacks. In coming into new model production the company's production schedule is going to be reduced about 20 per cent under its previous level.

War Orders Start

The war orders are starting to come. Cadillac received an additional $57 million contract for its Cleveland tank building program. The Kansas City, Kans., B-O-P assembly plant of GM will be used in building an undisclosed number of F-84 Republic Thunderjet fighters. Oldsmobile will produce 3.5 inch super-bazooka rockets in its engine parts plant in Lansing, Mich. This plant had formerly housed manufacture of the now discontinued Olds six-cylinder engine. GMC Truck & Coach Division, Pontiac, received a $100 million letter contract for military vehicles. Fruehauf Trailer Co. will build 35,000 special purpose military cargo trailers at its Avon Lake, O., facilities. The largest single order for military jeeps was received by Willys-Overland—$61 million, topping by $16 million the largest previous order placed in 1950. Chrysler Corp. got a $160 million contract for medium tank production at a plant to be built in Newark, D

The Business Trend

Will general price controls be enough to stem inflation? Federal economists are alarmed at rising individual and corporate spending

VERNMENT economists are more ried than they admit publicly at ising inflationary tides. They efists plugged in the price dike but they fear other economic will give away so fast that the situation will get out of hand. number of indicators warn of r ahead. One of the clearest is Liquid savings by individuals nted to less than one-fifth of 1 ent of income after taxes in the quarter of 1950, a new low. compares with an annual rate of 2 per cent in 1949 and about 6 ent before the war. In the third er, individuals saved on balance an estimated $100 million in liq- orm, compared with $1.4 billion e same 1949 period. Liquid sav- in the fourth 1950 quarter are ted to fall still lower.

rtgage debt of individuals in- ed $1.8 billion in the third period 50, another record rate. Other mer debt also showed a substan- gain, $1.7 billion. So, people are nly putting as much of the money they have now into things, but they are promising to put an increasing proportion of their cash into materials in the future, too. That spurs inflation in two ways: It bids prices up, and it means less confidence in the currency.

Indications are that corporate reactions are the same as individual. Manufacturers' inventories rose from $31.6 billion in October to $32.7 billion in November. The $1.1 billion increase was partly accounted for by higher prices, but most of the gain came from greater physical volume of goods. Industry is spending its money at an unprecedented rate in construction, also. In the week ended Dec. 21, heavy construction awards hit $692 billion, an alltime peak. At the yearend, engineering construction stood at $12.4 billion, a 51 per cent hike over 1949. Some $5.7 billion of that was for public building and $6.7 billion for private.

In the week ended Dec. 30, STEEL's industrial production index slipped to a preliminary 201 per cent of the 1936-1939 average. The holidays and natural gas curtailments because of the cold weather caused the decline.

Steel, Autos Hold Pace . . .

The two Mr. Bigs in metalworking, steel and automobile industries, continue to produce at record rates.

Steel mills are turning out ingots in excess of 100 per cent of theoretical capacity. Auto assembly plants are beginning to be nicked by materials shortages and model changeovers, but the industry's production outlook for the first quarter of 1951 is encouraging. Barring unexpected setbacks, nearly 2 million cars and trucks may be completed in the U. S. during January, February and March. That would compare with 1,645,879 in the first quarter of 1950 when production was held down by the Chrysler strike.

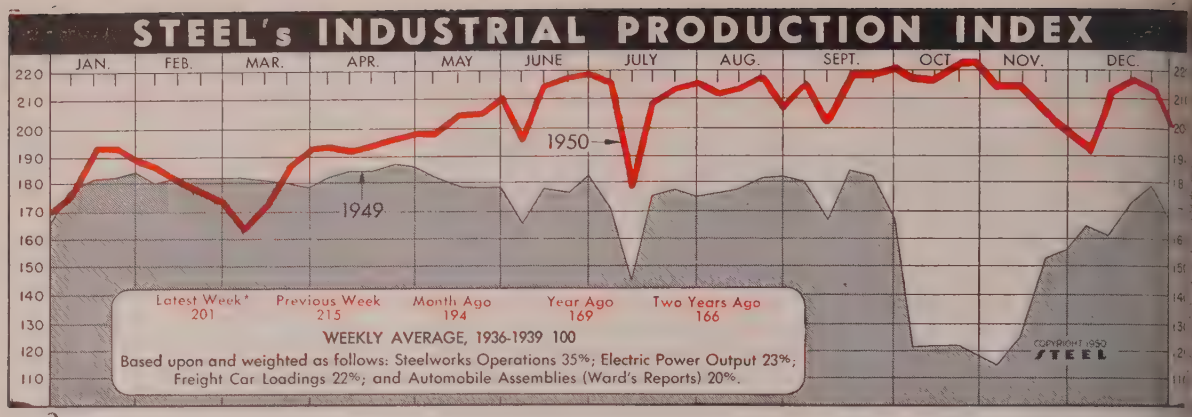
January production will be affected 20 per cent production cutbacks by Packard and Studebaker, slow assembly of new 1951 models by Chrysler and inauguration of 1951 model production by Buick and Oldsmobile.

Durable Goods Sales Soar . . .

Durable goods sales reached $10 billion in November, 3 per cent over

AROMETERS of BUSINESS

		LATEST PERIOD*	PRIOR WEEK	MONTH AGO	YEAR AGO
INDUSTRY	Steel Ingot Output (per cent of capacity)†	98.0	101.5	81.5	94.5
	Electric Power Distributed (million kilowatt hours)	7,000	7,033	6,716	5,493
	Bituminous Coal Production (daily av.—1000 tons)	1,825	2,001	1,508	1,565
	Petroleum Production (daily av.—1000 bbl.)	5,750	5,763	5,825	4,996
	Construction Volume (ENR—Unit $1,000,000)	$111.2	$692.0	$260.3	$66.9
	Automobile and Truck Output (Ward's—number units)	130,200	160,912	152,107	113,026
	* Dates on request. † 1950 weekly capacity is 1,928,781 net tons. 1949 weekly capacity was 1,843,516 net tons.				
TRADE	Freight Car Loadings (unit—1000 cars)	680†	747	740	496
	Business Failures (Dun & Bradstreet, number)	150	174	160	109
	Money in Circulation (in millions of dollars)‡	$27,916	$27,929	$27,543	$27,765
	Department Store Sales (changes from like wk. a yr. ago)‡	+17%	+9%	−3%	−14%
	† Preliminary. ‡ Federal Reserve Board.				
FINANCE	Bank Clearings (Dun & Bradstreet—millions)	$14,495	$18,247	$13,009	$11,844
	Federal Gross Debt (billions)	$256.7	$256.7	$257.0	$257.0
	Bond Volume, NYSE (millions)	$22.8	$32.6	$21.0	$20.5
	Stocks Sales, NYSE (thousands of shares)	14,128	17,372	12,212	7,977
	Loans and Investments (billions)†	$71.4	$70.3	$69.7	$67.4
	United States Gov't Obligations Held (millions)†	$33,810	$33,439	$33,306	$37,657
	† Member banks, Federal Reserve System.				
PRICES	STEEL's Weighted Finished Steel Price Index††	167.67	167.67	157.76	156.83
	STEEL's Nonferrous Metal Price Index‡	246.9	246.9	240.7	161.6
	All Commodities†	176.0	174.7	171.7	151.2
	Metals and Metal Products†	184.1	184.3	180.6	168.3
	† Bureau of Labor Statistics Index, 1926=100. ‡ 1936-1939=100. †† 1935-1939=100.				


STEEL's INDUSTRIAL PRODUCTION INDEX
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
220 210 200 190 180 170 160 150 140 130 120 110
1950
1949
Latest Week* 201
Previous Week 215
Month Ago 194
Year Ago 169
Two Years Ago 166
WEEKLY AVERAGE, 1936-1939 100
Based upon and weighted as follows: Steelworks Operations 35%; Electric Power Output 23%; Freight Car Loadings 22%; and Automobile Assemblies (Ward's Reports) 20%.
COPYRIGHT 1950 STEEL

Week Ended Dec.

the previous month on a seasonally adjusted basis and 50 per cent larger than a year ago, Commerce Department reports. The largest increases occurred in nonferrous and transportation equipment other than motor vehicles. The advance in durable sales was offset by a decline in nondurable sales, off 2 per cent from October.

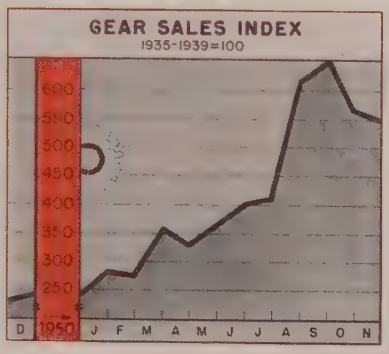
New orders placed with manufacturers during November were somewhat below October, the decrease being largely seasonal. For the durables, the decline was about 10 per cent. New business of nondurable-goods industries was down about 5 per cent. Unfilled orders in both the durable and nondurable groups increased. The rise in durable backlogs amounted to $1 billion and was distributed among all component industries except nonferrous metals.

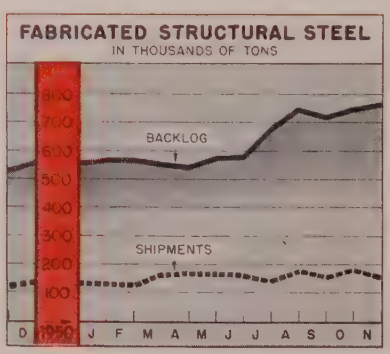
Sales, Profits Hit High . . .

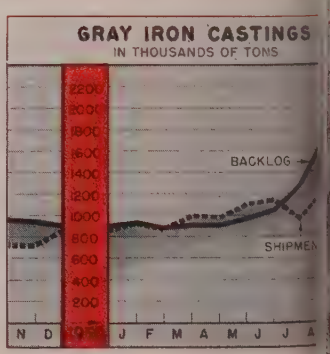
Sales and profits for U. S. manufacturing corporations set new records in the third quarter of 1950, according to the Federal Trade Commission and Securities & Exchange Commission. Sales increased 12 per cent over the previous high in the second quarter and amounted to $48.6 billion. Profits after taxes in the third quarter totaled $3.7 billion, increase of 16 per cent over the seco quarter.

Carloadings To Climb . . .

Freight carloadings in the fi quarter of 1951 may be 16.5 per c above those in the same 1950 peri according to estimates compiled by 13 Regional Shippers Advisory Boar Freight carloadings of the 32 prin pal commodity groups will be million cars in the first quarter 1951, compared with 5,947,451 act carloadings for the same commo ties in the like period of 1950.







Gear Sales Index

1935—1939=100

	1950	1949	1948
January	280.2	320.7	346.8
February	272.9	282.3	324.4
March	358.4	299.1	389.8
April	328.6	339.0	320.9
May	363.1	250.1	283.6
June	401.0	227.8	324.1
July	410.7	193.1	384.4
August	617.4	262.0	335.6
September	654.5	224.9	320.4
October	564.8	242.3	333.3
November	554.9	230.7	309.0
December	....	242.8	325.9

American Gear Mfrs. Association

Fabricated Structural Steel

Thousands of Net Tons

	Shipments		Backlog	
	1950	1949	1950	1949
Jan.	135.2	152.7	565	675
Feb.	129.6	145.9	565	683
Mar.	156.8	185.9	556	582
Apr.	164.4	179.2	540	628
May	168.1	171.1	578	599
June	172.1	172.3	580	583
July	141.6	148.0	684	605
Aug.	180.7	183.9	741	583
Sept.	157.0	162.1	716	562
Oct.	181.1	99.8	747	584
Nov.	154.6	117.2	763	527
Dec.	....	135.5	...	555
Total	....	1,853.5	...	...

American Institute of Steel Construction

Gray Iron Castings

Thousands of Net Tons

	Shipments		Backl
	1950	1949	1950
Jan.	913	1,040	914
Feb.	864	987	873
Mar.	996	1,075	922
Apr.	981	929	922
May	1,095	867	978
June	1,136	906	1,040
July	961	697	1,287
Aug.	1,202	872	1,670
Sept.	1,159	881	1,794
Oct.	1,255	716	1,840
Nov.	...	719	...
Dec.	...	862	...
Total	...	10,551	

* For sale. Bureau of the C

..., TV Sales at Peak ...

...e to 7.5 million television re...s and more than 14 million ra...vere manufactured in 1950 for ...ltime record, says Robert C. ...ue, president of Radio-Television ...facturers Association.

...nufacturers' sales amounted to ... $1.7 billion in 1950, a 90 per ...ncrease over 1949 sales and 125 ...ent more than in 1948. At the ... of the fall boom, the industry ...producing television receivers at ...nnual rate of better than 10 ...n sets and radios at the rate ...million units.

...it Man Sees Bleak Outlook...

...1951 business will increase its ...ty, but civilian output will be ... restricted, says Henry H. Hei..., executive manager of the Na... Association of Credit Men.

...or will be in short supply. ...s, despite all efforts to control ...ion, will rise in dollars. The buy... ower of the dollar may deterior... urther. Business earnings have passed their peak. Interest rates will rise, though not sharply.

Mr. Heimann advises: Don't speculate in inventories; keep your equipment up to the minute; anticipate increased taxes; maintain strong sales and credit departments; develop better credit worthiness with your marginal customers.

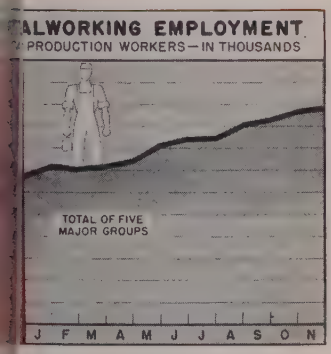
Civilian Pinch by March

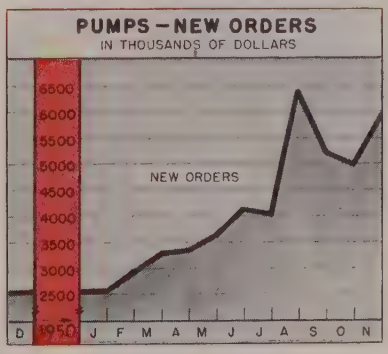
The real pinch in civilian goods will not be felt until next March, National Association of Purchasing Agents estimates. The group's business survey for December declares that a fairly high output of finished goods should continue to roll out as in-process inventories are used up.

The report expressed doubt that accelerated defense orders can be put into production in time to take up the anticipated slack in March and the early part of the second quarter. Industrial inventories are generally out of balance. The survey shows that raw material stores are probably below a practical working inventory.

Issue Dates of Other FACTS and FIGURES Published by STEEL:

...nstruction Dec.25	Ironers Dec.18	Steel Forgings Nov.20
...urable Goods Nov.27	Machine Tools Nov.27	Steel Shipments ...Dec.25
...nploy., Steel Dec.25	Malleable Cast. Dec.18	Vacuum Cleaners...Dec.4
...undry Equip. Dec.18	Price Indexes Dec.11	Steel Castings Nov.20
...eight Cars Dec.18	Purchasing Power .Dec.11	Wages, Metalwkg...Nov.27
...rnaces, Indus. ...Dec.18	Radio, TV Aug.14	Washers Dec.11
...rnaces, W. Air ..Dec.25	Range, Elec. Dec.4	Water Heaters Dec.25
...dus. Produc. Dec.11	Ranges, Gas Dec.4	





...letalworking Employment
...uction Workers—Five Major Groups

	Prim. Mtls.	Fab. Prod.	Mach- inery	Elec. Mchy.	Trans Equip.
	737	666	908	546	898
	955	988	929	558	896
	963	693	936	561	978
	977	699	959	572	872
	982	709	981	580	879
	1,007	722	1,003	595	899
	1,025	742	1,022	605	1,046
	1,051	769	1,034	615	1,078
	1,053	773	1,031	620	1,070
	1,086	814	1,060	655	1,118
	1,104	837	1,056	677	1,132
	1,116	850	1,111	708	1,151
	1,124	847	1,130	721	1,135

...au of Labor Statistics

Pumps, New Orders
In Thousands of Dollars

	1950	1949	1948
Jan.	2,586	3,390	3,819
Feb.	2,938	3,247	3,635
Mar.	3,313	3,593	4,703
Apr.	3,376	2,699	4,312
May	3.668	2,775	3,724
June	4,153	3,019	3,512
July	4,080	3,358	4,075
Aug.	6,429	3,767	4,520
Sept.	5,191	2,914	3,474
Oct.	4,985	2,539	3,571
Nov.	5,961	5,525	3,580
Dec.	....	2,560	4,263
Total	....	36,386	47,188

Hydraulic Institute

Brass • Bronze
Stainless • Monel
Alloy Steels
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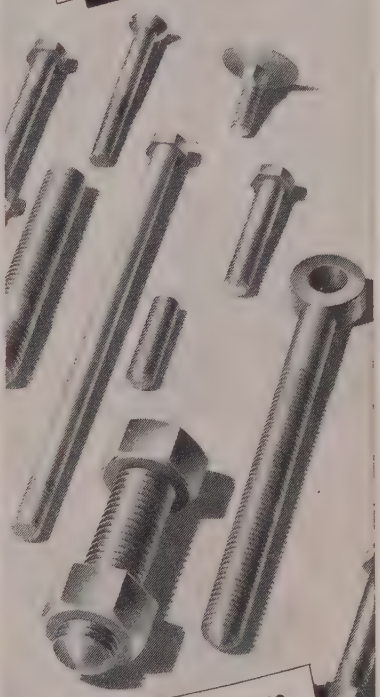
Here's a full line of bolts, nuts and studs in all types of metals. Accurately threaded to assure a uniform Class 3 Fit, Pawtucket products are made in standard dimensions or to your specifications.



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Use Headed and Threaded Fasteners for Economy and Reliability

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MANUFACTURING COMPANY
327 Pine Street · Pawtucket, R. I.
THE PLACE TO SOLVE YOUR BOLT PROBLEMS
T.M. REG.

Better lubrication, lower maintenance costs for roll neck bearings —

Gulf XXX Lubricant

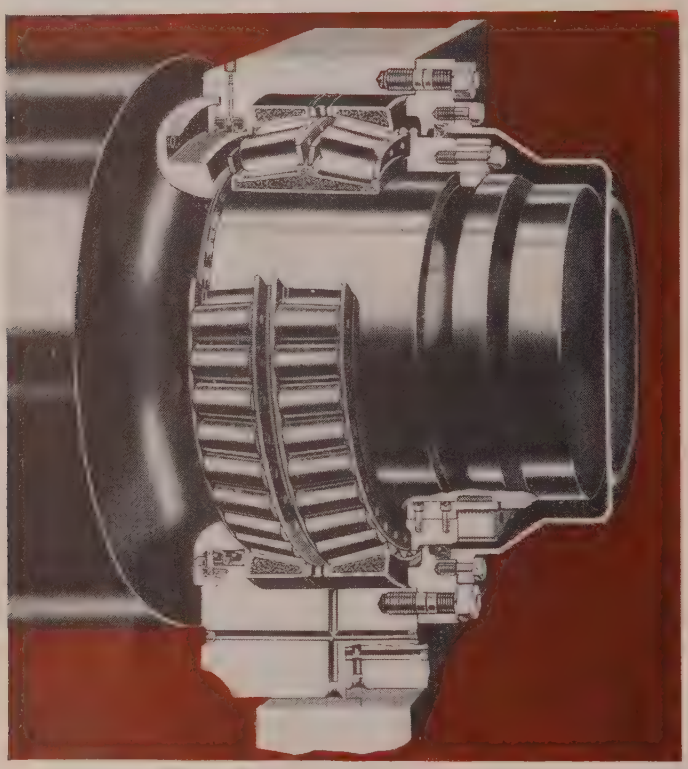


Photo courtesy The Timken Roller Bearing Company.

- X Exceptional extreme pre sure characteristics
- X High resistance to washo
- X Effective protection again corrosion
- X Good stability
- X High pumpability

Gulf XXX Lubricant provides the kind of lubrication that insures long life and low maintenance costs for roll neck roller bearings. Here's why! Gulf XXX Lubricant is a high quality grease that has exceptionally good extreme pressure characteristics—protects rollers and races subjected to shock loads or overloads. It provides that extra margin of protection so often required in rolling mill service.

Gulf XXX Lubricant stays put—is not washed out of the bearing, even when subjected to the washing action of large quantities of water. Thus bearings get continuous protection and grease consumption is kept to a minimum.

Another advantage of Gulf XXX Lubricant under wet conditions is its excellent rust-preventive characteristics — it covers every roller and raceway with a film that protects highly polished surfaces. You will eliminate bearing failures from this cause when Gulf XXX Lubricant is in u

Then, too, Gulf XXX Lubricant is a very sta grease—won't separate in storage or in servi It has excellent pumpability and is ideal for c tralized lubricating systems.

For further information on Gulf XXX Lub cant and other Gulf quality lubricants for st mills, call in a Gulf Lubrication Engineer tod Write, wire, or phone your nearest Gulf offi Gulf Oil Corporation · Gulf Refining Compa Gulf Building, Pittsburgh, Pennsylvania.

FIFTY YEARS OF SERVICE
1901 GULF 1951
PETROLEUM AND ITS PRODUCTS

Men of Industry

ALAN F. SHELDON
. . . president, Kennecott Wire & Cable

F. Sheldon, formerly vice presi- and general manager, was elec- president of **Kennecott Wire &** **Co.,** Phillipsdale, R. I., a sub- ry of Kennecott Copper Corp. He eeds **Robert L. Coe,** retired.

rt C. Black was appointed ad- sing manager, machinery divi- **Dravo Corp.,** Pittsburgh. He for- y was with Westinghouse Electric .

V. Landis was named manager, oit district office, **Allis-Chalmers Co.,** succeeding **F. S. Schuyler,** ed. Mr. Landis was manager, cuse, N. Y., office, and is suc- ed by **A. J. Mestier Jr.**

iam S. Lowe, executive vice ident, **A. P. Green Fire Brick Co.,** ico, Mo., was elected president ucceed **Robert S. Green,** resigned. Green continues as a director.

ROY J. FOSTER
. . . sec'y and dir., Consolidated Iron-Steel

Roy J. Foster, manager of warehouse sales, Republic Structural Iron Works Division, **Consolidated Iron-Steel Mfg. Co.,** Cleveland, was appointed secretary and member of the board of directors of the parent company. In these positions he succeeds the late **R. A. Godfrey,** who was Consolidated's executive vice president and secretary. Mr. Foster has been with Consolidated Iron-Steel for over 28 years.

Arthur V. Wiebel, vice president in charge of operations, **Tennessee Coal, Iron & Railroad Co.,** Birmingham, subsidiary, U. S. Steel Corp., was elected president to succeed **Robert Gregg,** retired. **John Pugsley,** comptroller, was elected to the newly established position of executive vice president, and is succeeded by **Hartwell A. Greene,** formerly assistant comptroller. **J. M. Spearman,** manufacturing operations manager, becomes vice president-operations.

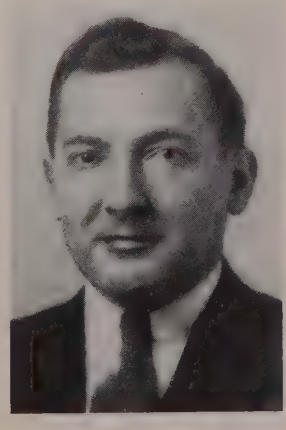
F. L. YETTER
. . . senior V. P., Wheeler Mfg.

F. L. Yetter was appointed senior vice president, **C. H. Wheeler Mfg. Co.,** Philadelphia. He rejoins the company after a 20-month period during which he served as director of foreign affairs for the Kuljian Corp. In 1946 he was elected vice president and assistant general manager of the Wheeler company, from which post he resigned in April, 1949.

Edward J. Hanley was elected president, and **Clark W. King,** executive vice president of **Allegheny Ludlum Steel Corp.,** Pittsburgh. Mr. Hanley succeeds **E. B. Cleborne,** resigned, but who continues as a director and vice president. **Frank B. Lounsberry** has retired as vice president and technical director, and **W. B. Pierce** becomes technical director. Mr. King succeeds Mr. Hanley and remains as treasurer.

W. E. Noyes, general sales manager of **Diversey Corp.,** Chicago, for the last four years, was named vice presi-

WILLIAM S. LOWE
. . . A. P. Green Fire Brick president



ARTHUR V. WIEBEL
. . . new president, TCI

W. E. NOYES
. . . Diversey vice president-sales

dent in charge of sales. He joined the company in 1935.

J. Oliver Black, formerly president, was elected chairman of the board of **Peninsular Metal Products Corp.,** Detroit. **Robert W. Burgess** is the new president. He was formerly vice president. **Roy T. Mitchell,** president, Banian Corp., was elected a director of Peninsular. The Banian Corp., Detroit, is now a sales representative of Peninsular Metal Products.

Capt. David R. Hull, USN, ret., was elected a vice president of **Raytheon Mfg. Co.,** Waltham, Mass. Captain Hull, formerly assistant manager of the equipment divisions, becomes manager to succeed **Wallace L. Gifford,** who continues with the company as a director and vice president in an advisory capacity.

Charles L. Hardy was elected president, **Joseph T. Ryerson & Son Inc.,** Chicago, to succeed **Everett D. Graff,** who becomes chairman of the executive committee. **Thomas Z. Hayward** was elected vice president in charge of sales.

Lorenzo Semple was elected vice president and treasurer, and **John W. Brennan** secretary, **United States Pipe & Foundry Co.,** Burlington, N. J.

John A. Bukowski was appointed general superintendent, **Atlas Foundry Co.** and **Atlas Stainless Steel Co.,** Irvington, N. J. He was works metallurgist with Worthington Pump Co.

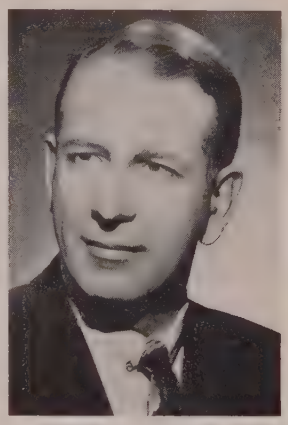
American Brass Co., New York, elected **John A. Coe Jr.** president to succeed **Arthur H. Quigley,** now chairman of the board. **Clark S. Judd** submitted his resignation as chairman due to ill health. Mr. Coe moves up from executive vice president. **William M. Moffatt,** who has been vice president in charge of manufacturing, was elected executive vice president. **Edward M. Bleser** succeeds retiring secretary-treasurer **Edwin J. Rockwell.**

Farnsworth Chapin was appointed sales manager, **Aquadyne Corp.,** New York.

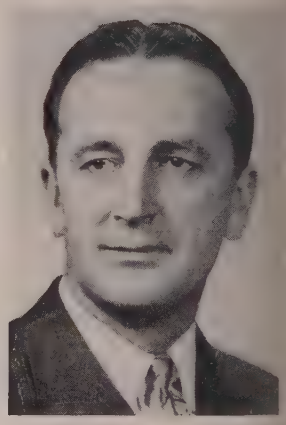
Morse Twist Drill & Machine Co., New Bedford, Mass., a division of Van Norman Co., appointed **F. C. Helms Jr.** as Midwest branch manager. He will have headquarters in Chicago at the new Morse office, and succeeds **Charles F. Myers,** appointed sales manager, with office in New Bedford. **Norman S. Fagerson** was

J. OLIVER BLACK
. . . chairman of Peninsular Metal Products

ROBERT W. BURGESS
. . . president of Peninsular



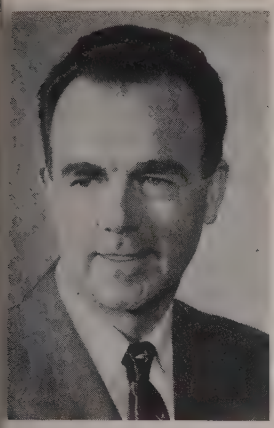
CHARLES L. HARDY
. . . new president at Ryerson



THOMAS Z. HAYWARD
. . . Ryerson vice president-sales

ARTHUR H. QUIGLEY
. . . board chairman, American Brass

JOHN A. COE JR.
. . . new president, American Brass



HOWARD E. MALONEY
electric wire sales mgr. at Roebling's

WILLIAM J. FLEMING
. . . transfers to General Electric X-Ray

DWIGHT A. BESSMER
. . . assistant to the president at Timken

ated a representative for Morse cago to succeed **M. P. Lansing,** presentative in Texas.

d E. Maloney was made man- of sales, electrical wire divi- **John A. Roebling's Sons Co.,** n, N. J. **Frank T. Craven** was assistant manager of sales, and **I. Hainsworth** becomes eastern al manager.

Watts was appointed assistant l sales manager, **Wickwire er Steel Division,** Colorado Fuel n Corp., New York. In 1950 he shed and managed the pig iron semifinished sales department. nager he is succeeded by **R. M. er,** but he continues as super- and director.

can Metal Co. Ltd., New York, nted **Freeman H. Dyke** manager subsidiary, **United States Metal ng Co.,** at Carteret, N. J. Mr. was with Acvero del Pacifico, huano, Chile.

William J. Fleming, vice president of engineering, Trumbull Electric Mfg. Co., a subsidiary of General Electric Co., was transferred to **General Electric X-Ray Corp.,** Milwaukee, also a subsidiary, as vice president in charge of engineering and manufacturing operations.

Arthur L. Chapman was elected a vice president, **Sylvania Electric Products Inc.,** New York. He continues as manager of the radio and television division in Buffalo and its parts division in Warren, Pa.

Pontiac Motor Division, Pontiac, Mich., General Motors Corp., appointed: **E. R. Pettengill,** administrative assistant to the general manager; **B. E. Starr,** general manufacturing manager; **A. F. Johnson,** manufacturing manager; **J. P. Charles,** assistant chief engineer; **C. O. Johnson,** general plant superintendent; and **George Guinn,** axle plant superintendent.

Timken Roller Bearing Co., Canton, O., appointed **Dwight A. Bessmer** assistant to the president. He is succeeded as director of purchases by **Paul E. Young. R. J. Archibald** was made assistant general purchasing agent.

Whiton Machine Co., New London, Conn., appointed **Evan Price** as turbine sales manager. He was in charge of turbine sales for Kissisk Co., New York.

W. E. Henges was appointed vice president, **Graybar Electric Co.,** New York. He continues as assistant to the president, to which position he was appointed in September.

Russell B. Weil joined **Franklin Metals Co.,** Newark, N. J., to serve as buyer and seller of metals.

Charles H. Besly & Co., Chicago, elected **Norman C. Minehart** as vice president in charge of its abrasive division and **Jack T. LeBeau** as manager, abrasive department.

ITUARIES...

P. Hoelzel, 67, president, **Pitts- Screw & Bolt Corp.,** Pitts- died Dec. 26.

B. Anstine, 73, general super- ent, **Motor & Machinery Cast- o.,** Detroit, died Dec. 15.

J. Paulus, 62, general man- fabricated steel construction, **hem Steel Co.,** Bethlehem, Pa., Dec. 22.

Woodworth, founder of two gan manufacturing companies, n Detroit Dec. 27. He had been ni-retirement since the end of War II. Mr. Woodworth be- is career with Ford Motor Co., starting in the tool room, and later established and managed the company's aircraft plant. He founded **Ex-Cell-O Corp.** in 1919 and retired as its president in 1937. In 1939 he founded the **N. A. Woodworth Co.,** producer of aircraft engine parts.

John C. Rohleder, 60, president and treasurer, **Watervliet Iron & Brass Foundry,** Loudonville, N. Y., died Dec. 25.

Charles H. Cannon, 61, vice president and treasurer, **Michiana Products Corp.,** Michigan City, Ind., died Dec. 26.

Ernest P. Waud, 68, chairman of the executive committee, **Griffin Wheel Co.,** Chicago, died Dec. 22. He was associated with the company 45 years, and had served in numerous capacities prior to becoming vice president in 1919 and president in 1937.

Clermont C. Covert, 79, associated for 28 years with **W. & L. E. Gurley,** and from 1926 until its closing in 1948 manager of the New York office, died Dec. 11.

Col. Eugene C. Peck, former general superintendent and a director, **Cleveland Twist Drill Co.,** Cleveland, died at Hollywood Fla., Dec. 31.

Dr. Jacob L. Snoek, head of the physics department, **Horizons Inc.,** Princeton, N. J., died Dec. 3 in an automobile accident near Elkhart, Ind.

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BROACHES AND BROACH TOOLING EXCLUSIVELY

Production AND Engineering NEWS AT A GLANCE

AST THEM AND SAVE— Cut wire shot has ntributed to the savings realized in the blast aning (p. 60) of automotive forgings in a ge Michigan shop. The parts are tumbled wn an inclined drum, the blasting area hav- g rubber-covered plate conveyors. Scale and ot drop through the perforated plates and e separated for reuse. The equipment is not o expensive, requires a minimum of labor and s cleaned forgings at a cost as low as 80 cents on and at a rate of 12 tons an hour. Emerg- g from the blasting barrel, the cleaned pieces e deposited on a conveyor belt arranged with gle gates to deflect them down chutes to tote xes.

AME OR NO?— Advocates of the chassis- s type of automobile body claim this type of nstruction saves 60 per cent of the total weight the conventional frame and body and also lds weight economies in engines, drive sys- ns, suspension and axles. They figure the tal available weight saving by eliminating e conventional chassis frame is equivalent to e weight of this frame, or about 225 pounds. is amounts to 9 per cent of the total steel used the car. However, the automobile industry no means is universally moving toward this pe of construction, for one reason because of e huge investment involved in changing over anufacturing and assembly facilities. As a atter of fact, the chassisless frame has been ther slow to find acceptance, with one or two ceptions.

I THE LAB CRUCIBLE—The search for new aterials capable of holding their own in high- mperature service broadens continually. Out two university laboratories has come a study the possibilities of plating other metals with olybdenum which has superior high-tempera- re properties. While their technique of plat- g is a rather involved procedure, at least they oduced (p. 62) an assortment of plates which owed up favorably. The best bonding of olybdenum to steel was achieved with an in- rlayer of electrodeposited nickel.

ROMOTION FOR TEAMWORK— Quality ntrol is going great guns at Ford Motor Co. d its various technical phases are supple- ented by an intensive quality promotional mpaign, involving such things as posters, pay velope stuffers, exhibits, slogan contests, mo- on picture films, suggestion awards, newspaper ticles, even selection of a company "quality een." The latter was described as "the girl hose 'normal distribution' the 125,000 par- cipating employees most appreciated." Con- ol charts are mounted on hundreds of ma- ines throughout Ford plants to give operators a running picture of how their production may be varying from standard. The inspection function thus is brought right to the production machine. Scrap and rework are reduced. Schedules are easier to maintain. The teamwork spirit is improved.

KEEP 'EM ROLLING— If you could post a sign on every machine tool in a production operation, stating its value per minute of operating time, it might be a good reminder of the all-important fact that an idle machine is a millstone around the neck of profits, observes Guy Hubbard, our peripatetic machine tool editor. He points (p. 76) to efforts being made to minimize down time of machines—careful planning of materials handling facilities, detailed study of workholding methods and simplifying machine setups.

ATTENTION ENGINE MEN!— Cylinder liners of sintered refractory material having high hardness, with a steel outer sleeve shrunk into position to put the liner under approximately 30,000 psi tangential compressive stress, have been proposed, according to a review appearing in a British technical abstract service. Apparently tests on the unusual combination have indicated that the compressive stress prevents cracking of the refractory liner from the shock of the explosion and also results in less wear on pistons and rings because of the reduced tendency for seizure and scoring.

SIMPLE IDEA PAYS OFF— Ingenious system for inspecting both sides of coiled strip rolled at a refurbished eastern nonferrous mill (p. 72) has eliminated both turnovers and rewinding. The strip, after one side is inspected, is simply guided over a roll to reverse its direction and bring the reverse side over a second inspection table. Drive rolls are positioned at the start of unwinding and just before the rewind. The setup knocks 25 per cent off inspection time.

PATH PLOTTING AIDS NOISE SLEUTHS— To track down sources of machinery noise, acoustical detectives resort to noise circuits similar to electrical circuits. Dr. Howard C. Hardy, supervisor of acoustics and vibrations at Armour Research Foundation, Chicago, says finding the original sound source in a machine is often complicated by the fact there are secondary sources between the energy source and the radiating surface. Noises follow devious paths, all requiring careful analysis. By making schematic diagrams on which are plotted the paths that noise energy takes between its source and radiation point, the relative influence of each path can be evaluated and the simplest and most inexpensive method determined to produce results.

TITANIUM...

HOW IT FITS IN YOU

Despite currently high cost, the metal—and particularly its alloys—shows such exceptiona strength per unit weight at normal temperatures, plus unmatched corrosion resistance that a broad expansion of use in aircraft and marine fields appears certain. Bottle neck is ore reduction and melting methods, but millions are being spent and a break through could be imminent. Military now is commandeering virtually the entire outpu estimated at roughly 2000 pounds a day, and a drop in the bucket, as against deman

BARELY out of its laboratory cocoon, titanium has skyrocketed to a position of enviable significance and portent in the field of structural materials. Where it stands now and where it is headed are questions the metalworking industry may well ponder. High strength/weight ratio and superior corrosion resistance, together with good workability, are offset by high cost and short supply, but the latter are subject to correction as the technology of the metal is better understood, and as facilities are enlarged.

From the military standpoint, of course, cost is a trifling item. Witness the statement of an Air Force general to the effect that titanium, even at $20 a pound, has no equal in a combat plane.

Economics of titanium in the air are not too difficult to prove even for peacetime use and with the metal priced in dollars per pound. A rule-of-thumb among airplane designers is that every pound of weight saved means an increase in annual revenue of $200. So if you throw out most of the stainless steel in a 40,000-pound transport like a DC-4 in favor of half-as-heavy but just-as-strong titanium, the potential revenue increase will write off a lot of high-priced metal in a hurry.

Production of titanium now is hardly beyond the pilot-plant stage. One estimate late last fall placed output at an annual rate of 120,000 pounds. By now this may have been moved up to 2000 pounds a day. Another year will see a further major increase; whether it will be abreast of the military's request for 5-25 *tons* a day is dubious. That will take time and a lot of money.

Oxides Are Plentiful—A few ABCs. The element titanium is over 150 years old but its emergence as a useful metal dates back only three or four years. Fourth most abundant structural metal (0.62 per cent) in the earth's crust, exceeded by aluminum, iron and magnesium in that order, its reserves in the form of ore are extensive. Thus far, only concentrated deposits, principally ilmenite which runs 20-40 per cent titanium oxide and 40-55 per cent iro the form of oxide, are worked. Titanium oxide many years has been used as a paint pigment: ports from India have accounted for as much as per cent of oxide consumption for this purpose. posits of rutile are another source of titanium ox although less important than ilmenite.

Ores now being worked are widely scattere Florida beaches, in Virginia, the Adirondacks in York, Idaho and Quebec, Canada. Obviously, as ti ium production moves from poundage to tonnag considerable extension of mining and concentra operations will be necessary. Fortunately, mos the ores are loose and easily handled, either by po shovel or by dredge in the case of beach sands.

Separation of the metal from its oxide canno accomplished by conventional smelting methods least not in the present state of the art. If an could perfect a "blast furnace" or similar contin method of smelting the ilmenites, he could nam own price. It is necessary to handle the reduc by a double batch-type system. First the titan oxide is converted to a tetrachloride by subjec it to the action of chlorine gas under heat. tetrachloride then is fed into a cylindrical iron actor in which molten magnesium combines exoth ically with chlorine to form magnesium chloride leasing free titanium in the form of a sponge a 99.5 per cent pure. The second phase of the pr involves melting the sponge, either in an arc o duction furnace, under an inert atmosphere bla of either helium or argon, usually the latter.

Research Is Recent and Rushed—On Sept. 14, the pigments department of E. I. du Pont de Nem & Co. Inc., Wilmington, Del., announced the commercial operation to extract titanium from ores, and until recently has been the source probably 90 per cent of all available metal. I production there was confined to sponge and plant was of pilot size with maximum daily cap

MORROW

By A. H. ALLEN
Associate Editor, STEEL

...ense burst of sparks, sim... to those accompanying ...h welding of aluminum or ...gnesium, makes a spectac... show in the burnoff and ...et of a roll-formed titanium ...g. Flash can be removed ... air jet right in the welder

American Welding & Mfg. Co.

...) pounds. Production facilities have since been ...sed and are now considered of commercial pro... ...ns. DuPont next went into the study of melt... ...ethods and offered small ingots for sale to ... interested in experimental fabrication.

... research continued into methods for alloying, ...g, rolling, welding and other forming processes, ...xtensive data obtained from these studies have ... published. The company now has sponge for ...t $7.50 per pound in quantities less than 100 ...s, $5 a pound in larger quantities. It contains ...imum of 99.5 per cent titanium, 0.25 per cent ...um iron and 0.05 per cent maximum nitrogen. ...ies also are available for production of induc... ...elted ingots in 10, 100, 250, 400 and 600-pound ...nd arc melted ingots of 50-pound size. These ...e either commercially pure titanium or alloys ...d to customers' specifications.

... pioneering in the field has been the Titanium ... Corp. of America, a jointly-owned subsidiary ...tional Lead Co. and Allegheny Ludlum Steel Corp., which has been assigned the responsibility for developing, marketing and distributing the metal, its alloys and related products. National Lead is a leading producer of titanium pigments while Allegheny Ludlum is a principal producer of stainless and high-alloy steels; combination of the two was a natural for a fully-integrated operation in titanium, from ore to finished product.

National Lead mines ilmenite from its open-pit deposit at Tahawus, N. Y., and also processes rutile obtained from foreign and domestic beach deposits. Sponge is produced at the company's plant in Sayreville, N. J., and at its Titanium Alloy Mfg. division in Niagara Falls, N. Y. The latter company was organized over 40 years ago and has long specialized in producing ferroalloys for the steel industry and other users. It was acquired by National Lead in 1948.

In recent weeks National Lead has concluded lease arrangements on an 80-acre tract with seven buildings having 200,000 square feet of manufacturing

space at the state-owned Basic Magnesium Industries site in Henderson, Nev., to undertake manufacture of titanium sponge, using electric power from Boulder dam, as well as the subsequent melting of the sponge to ingot. Ilmenite ore probably will be brought in to Los Angeles by boat and trans-shipped by rail to Nevada.

Sponge titanium from the eastern sources is melted into ingots at the Watervliet, N. Y., plant of Allegheny Ludlum, where a full-scale expansion of facilities is well under way, with ingots up to 1000-pound size now being produced. They are further processed into forgings, bars, sheet, plate, strip and wire in mills at Watervliet, Brackenridge, Pa., West Leechburg, Pa., and Dunkirk, N. Y.

Power Load Heavy for Recycling—A modification of the Kroll process for reducing the oxide to sponge has been perfected, by which the resulting magnesium chloride is converted back to magnesium and chlorine in an electrolytic cell and recycled through the reactor, thereby eliminating or at least minimizing the requirement for fresh magnesium and chlorine. Major power requirement in the process is for reconversion of the magnesium chloride, a figure of 10-15 kwh per pound of sponge being generally accepted. With this arrangement, the process becomes at least semicontinuous.

The basic process was devised many years ago in Germany by Dr. Wilhelm Kroll, at one time associated with Siemens & Halske there. It was appropriated by the Bureau of Mines in 1943, and Dr. Kroll has been with the bureau since the war. One of the first major published works on the metal was the bureau's report, "Metallurgy of Titanium and Its Alloys," released in 1946.

New Combine to Pittsburgh—Another rapidly expanding source for titanium and its alloys is Rem-Cru Titanium Inc., a manufacturing, sales and research organization jointly owned by Remington Arms Co. Inc. and Crucible Steel Co. of America. Headquarters will be established in a few months at Midland, Pa., site of a large Crucible Steel plant, modernized to the tune of $27.5 million since the end of the war. Titanium ingots currently are being produced at Remington's Bridgeport, Conn., plant, and are approaching the 1000-pound size. This operation, along with sales and research activities, will be transferred to Midland. A part of Rem-Cru's ingot processing is being done at Crucible's Sanderson-Halcomb works at Syracuse, N. Y., where facilities for rod, wire and other shapes are available. Billets, bars, plates and sheets are being rolled at the Park Works in Pittsburgh, while other Crucible plants will participate as production requirements develop. Officers and board of directors of Rem-Cru have been named entirely from the executive staffs of the two companies.

Remington Arms has been busy with titanium for over three years, enlisting the aid of Battelle Memorial Institute, Columbus, O., for alloy development, physical property testing and survey programs. Prof. Robert F. Mehl, head of the department of metallurgical engineering and director of the metals research laboratory at Carnegie Institute of Technology, Pittsburgh, has acted as a consultant on th research program for about two years.

Rem-Cru's commercial pure titanium is availab in two grades—RC-70 and RC-55—with minimu yield strengths of 70,000 psi and 55,000 psi, respe tively, the latter, of course, having somewhat high ductility. The company's first commercial alloy, R 130-A with minimum yield strength of 130,000 p was developed to fill requirements of the aircraft i dustry for a formable, structural sheet material the intermediate temperature range. It is essenti ly a binary, 7 per cent manganese, titanium-base loy, the manganese providing the strengthening effe

A similar alloy, RC-130-B, was developed specific ly for fabrication into forgings and bar; it is esse tially a ternary alloy with 4 per cent manganese a 4 per cent aluminum. The aluminum addition rais the temperature of the alloy's phase change fr alpha to beta, resulting in a forging alloy with i proved creep strength above 600° F and retaini

Titanium tetrachloride plus molten magnesium react to titanium sponge and magnesium chloride, th latter capable of being reconverted to magnesiun and chlorine with considerable expenditure of power Sponge metal looks just like ordinary gray coke

excellent forgeability at higher temperatures.

Since Du Pont owns a substantial part of Remi ton Arms, there naturally has been a fairly close up between it and Rem-Cru in the field of titani However, Du Pont is careful to avoid any exclu arrangements and is literally opening its doors to comers insofar as supplying the metal and the te nical know-how of its metallurgy and fabrication concerned.

Titania Slag on the Way—Still another joint dustrial effort, this one in the field of titanium o is the Quebec Iron & Titanium Corp., owned t thirds by Kennecott Copper Co. and one-third

Jersey Zinc. It proposes to convert ilmenite nined about 500 miles northeast of Montreal tania slag and pig iron by a novel electric fur- nethod, a plant now being in operation at Sorel, on the St. Lawrence river 50 miles from Mon- a with initial capacity for handling 300 tons of aily. Ultimately there will be installed five electric furnaces, each having six electrodes and rated at 24,000 kva. Power will come from ew $40 million hydroelectric plant of the Shaw- Water & Power Co. which has output equiv- to 160,000 hp, half going to Quebec Iron & um.

he process, coal, ore and limestone are mixed nder the arc iron is separated from the ilmenite, g to the top and being tapped off for casting igs. The remaining titania slag has been en- to 70-85 per cent TiO_2 from an original 35 per and is cast into blocks and crushed for water ent to Atlantic ports in the U. S. Investment

more so than aluminum alloys and considerably better than many specialty steels, particularly in salt water and marine atmospheres. In this respect it ranks with platinum and materials like Hastelloy C. Corrosion resistance is attributed to formation of a micro-thin surface coating of impenetrable and insoluble oxide.

Titanium alloys have higher fatigue resistance than aluminum, somewhat higher than steel; they are far harder than aluminum and approach alloy steel, surface hardness comparable to nitrided steel being readily obtained. The metal has much lower linear coefficient of expansion and lower thermal conductivity than either aluminum or alloy steel. Some promising indications have been observed in erosion and wear tests. Impact strength exceeds that of aluminum and a few tests have shown the likelihood of values above those for the best steel alloys.

But you can't have everything. Titanium loses strength and becomes embrittled on continued expo-

Allegheny Ludlum Steel Corp.

e is a 53 x 135-inch sheet of commercially pure nium, 0.025-inch thick, a number of which were ed for Boeing Aircraft last summer. Rolling prac- is similar to that required by stainless steel, ex- pt for the somewhat lower heating temperature

sure to temperatures above 1000° F. While this is beyond the service range of aluminum, it is well below the operating area for high-temperature alloy steels and other complex refractory alloys. Even though its melting point is 3150° F, it appears unlikely future developments will alter the metal's excess reactivity above 1000° F. Poor creep values for pure titanium may be corrected by both cold work and alloying. Elastic moduli of alloys are higher than for aluminum but are well under the values for alloy steel. Tendency of the metal to gall makes applications involving sliding contact dubious unless suitable coatings or surface treatment can be devised. And as yet it has not been possible to weld titanium satisfactorily to other metals. Brazing is showing promise, as is cladding to carbon steel. Electroplating of chromium direct on the metal seems to be feasible.

At temperatures above 1200° F unalloyed titanium

Sorel plant is said to run to around $30 mil- narking it as a major factor in the future sup- titanium oxide, both for pigments and for re- n to metal. By 1952 it is expected output from will be up to 700 tons of titania slag daily, ne- ating additional sources for electric power.

and Marine Uses Dominate—Titanium is classed ight metal, weighing 0.16 pound per cubic inch. 60 per cent heavier than aluminum but only 56 nt as heavy as alloy steel. Alloys are superior ength to most alloy steels and have a strength/ t ratio well beyond the more common engineer- etals. Corrosion resistance is exceptional, much

has high reactivity with gases—oxygen, nitrogen, carbon dioxide, carbon monoxide, hydrogen and water vapor. As little as 1 per cent oxygen or nitrogen seriously impairs ductility and since the reaction is irreversible the metal becomes useless through embrittlement. Alloys are under development which show a marked improvement in oxidation resistance. The deficiency, of course, does not preclude forging and rolling at 1600-1800° F, since then the metal is at temperature a relatively short time and develops only a thin oxide film.

Melting Techniques Embryonic — Tricky as the process is for reduction of oxide to sponge, with its requirement of an argon atmosphere and frequent perplexing lack of uniformity from heat to heat, melting of the sponge to massive ingots proved just about as tough. Molten titanium gobbles up all chemically active gases and, once absorbed, they stay put for good, with resulting embrittlement of the metal. A further complication is titanium's avidity for every known refractory—equally ruinous.

Induction melting in a graphite crucible under a helium or argon atmosphere has proved feasible, but there is usually a carbon pickup of from 0.25-1.0 per cent which lowers ductility. Allegheny-Ludlum has adopted arc melting in a water-cooled copper crucible, with argon protective atmosphere. Cold copper is about the only good conductor not wetted by molten titanium, so there is no pickup from the crucible. If tungsten electrodes are used, there may be some pickup of this element, although this can be circumvented by use of either solid or powdered-compressed-sintered titanium. The molten metal usually is not tapped from the crucible, but is cooled therein to an ingot the shape of the crucible. At best, both types of melting are ill-suited to tonnage production, so it is reasonable to anticipate fairly complete revisions of melting practice before titanium can compete pricewise or quantity-wise with other structural metals.

Chemically pure titanium is difficult and even more costly to produce, about the only satisfactory meth being the iodide process, first devised by Dutch s entists and involving deposition of the metal on hot filament in an enclosed container. Battelle M morial Institute has been pursuing the developme of this process intensively.

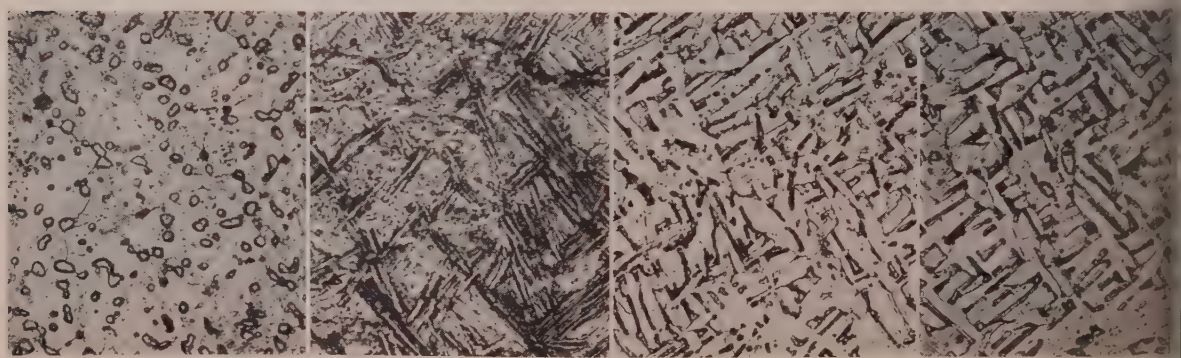
Once in ingot form, the rest is fairly smooth sa ing. The metal can be rolled, forged, cold forme ground, machined, welded and otherwise worked mu as is austenitic stainless steel. A number of st companies have experimented with rolling small i gots and report no difficulties. They tell their m crews: "Here is some titanium. Handle it just li you would stainless steel except for heating it to temperature 400 degrees lower." Republic St Corp. at Massillon, O.; Niles Rolling Mill Division Sharon Steel Corp. at Niles, O., and Universal Cyclo Steel Co., Bridgeville, Pa., are three mills which ha processed limited amounts of titanium, both in co mercially pure and alloy forms. Republic also h experimented with melting the sponge, both by ind tion and arc furnace, making small ingots of 70-pou size. The only complaint voiced by mills and fat cators is that the work has come to practically standstill because of inability to buy any more spon or ingot, all available supplies being snapped up the military services and the Atomic Energy Co mission.

Forging Alloys at $10-$25 per Pound—Two propr tary titanium-base alloys, L-2748 and L-2749, are first in a series to be offered in pilot plant quantit by P. R. Mallory & Co., Indianapolis, which has b working on their development for the past four ye under contract with the Navy's Bureau of Aeron tics. Summary of the properties of these two all is given in an accompanying table, comparing th with cold-rolled carbon steel, stainless steel 24ST aluminum alloy. The stronger of the two, 2748, has a nominal composition of 3 per cent a minum, 5 per cent chromium and 0.30-0.40 carbon. forges readily at 1650-1725° F. Mallory has now c pleted installation of induction melting equipment pable of supplying ingots up to 500-pound wei Graphite crucible and ingot mold are used, with conventional argon atmosphere maintained over melt.

These alloys are available in limited quantities ingot, forged rod and bar (*Please turn to Page*

Four photomicrographs of flash welded commercially pure ½-inch round titanium bar. Left to right: Parent metal; weld zone after welding; weld zone after heating 10 minutes at 1650 °F and furnace cooling; and weld zone after heat treatment for 20 minutes at 1650-1700 °F and furnace cooling. Etchant was 1 per cent hydrofluoric acid, 4 per cent nitric. X500

American Welding & Mfg



SEEN AND HEARD IN THE Machinery Field

By GUY HUBBARD
Machine Tool Editor

D, SWEAT AND SCREW THREADS: Little than two years have elapsed since a distin- d group of representatives of industries and e ments of the United Kingdom, Canada and the . States, met at National Bureau of Standards shington and signed a mutual agreement of on unification of the American and British s of screw threads.

hese troubled times when we sadly recall so diplomatic pacts which promised so much and ted to so little, it is encouraging to remember an enginering "treaty"—signed without any amount of fanfare—not only is standing the time but also promises to be a factor of major ance in defense of material and spiritual ideals western world.

one who ever has tried to insert a screw cut to stem into a hole threaded to another system, d ample reason to regret that Sir Joseph Whit- of Manchester, England, and William Sellers ladelphia, failed to come to a meeting of minds. British system, originated by brilliant but dog- Whitworth in 1845, was based on a thread of 55 degrees with rounded crests and roots. American system, originated by brilliant and hat more affable Sellers in 1864, had a thread of 60 degrees with flat crests and roots. The r of threads per inch—with the exception of -inch coarse thread—was the same for both. se minor differences in angle and shape, how- effectively barred international interchange- . Those minor differences caused no small t of mechanical trouble between us and our allies in World War I. In World War II they out to be one major reason for the "blood weat" about which Winston Churchill spoke.

en the unification pact finally was signed on ber 18, 1948, it was thought of primarily as portance in facilitating commerce between our related countries. Today, the fact that the and ourselves are mutually agreed on a 60 angle, rounded root and choice of flat or round- ernal crests, spells interchangeability between ess threaded details in armament involved in -ordinated military undertakings. Unimportant screw threads may seem to politicos—they well can weigh in our favor the balance be- victory and defeat.

IBILITIES OF BURNISHING: Considering that burnishing of machine surfaces was one of the means for attaining fine finish on circular work, singly little is on record regarding the history s system, methods employed, or even the re- attained. These facts were driven home to me ly in correspondence with John O. Almen, long figure in General Motors' research activities.

oing back into my own experience, I remember having seen burnishing rolls in successful op- n more than 40 years ago on early model Grid- tomatics. The object of these roller tools pri- was to put finishing touches on accuracy as s surface finish. However, those "tool engi- neers" back in 1908 firmly believed that rolling also improved wearing quality of parts by increasing their surface hardness. In view of what has been achieved more recently by "shot peening", their belief seems to have been justified.

Dipping back still further in my recollections, I recall conversations with the late Christopher Miner Spencer, who invented the original "automatic" 80 years ago. Not only did he apply roll burnishing to his early automatics, but he in turn recalled having seen this method applied to finishing of journals on railroad axles when he first became a journeyman machinist way back at the time of the Mexican War.

One of the interesting things about study of the history of machine shop practice is that "new ideas" often turn out to be revivals of old ideas.

As far as roller burnishing technique is concerned, that "dividend" of increased surface hardness may be an extremely important one in 1951. John Almen and other researchers recently have discovered that there are times when conventional machining does invisible harmful things below the surface when doing visibly good things on the surface. Admittedly, we still have a lot more to learn about all this. In the meantime, it may be very much in order to devote active, creative attention to surface and subsurface possibilities of rolling—taking full advantage of 1951 machines and tools in developing these possibilities.

SAE RALLIES FOR ACTION: This week I am in Detroit attending the 1951 annual meeting of the Society of Automotive Engineers. This is not merely one of the biggest conventions of one of the world's largest engineering societies. It can better be described as a great rally to the cause of national defense on the part of our most powerful single industrial group.

Infinitely more than in 1917-18, much more even than in 1941-45, our country now depends on the automotive industry for combat machines for action on the Sea, in the Air, on the Earth. Our most potent weapons today are integral with engine-driven hulls, wings, wheels and crawler treads. No longer is there a sharp line of demarkation between "vehicles" and "weapons". No longer is there a sharp line of demarkation between the automotive industry and the "munitions industry".

Like a corps of highly trained, fully equipped reserves, the entire membership of SAE is ready and waiting to get production rolling as never before in the Arsenal of Democracy.

General view of the Pangborn setup for blasting forgings. Blasting machine is at right and dust collector at top left. Sorting belt conveyor is below the collector

How Buick Cuts Forging Cleaning Cost

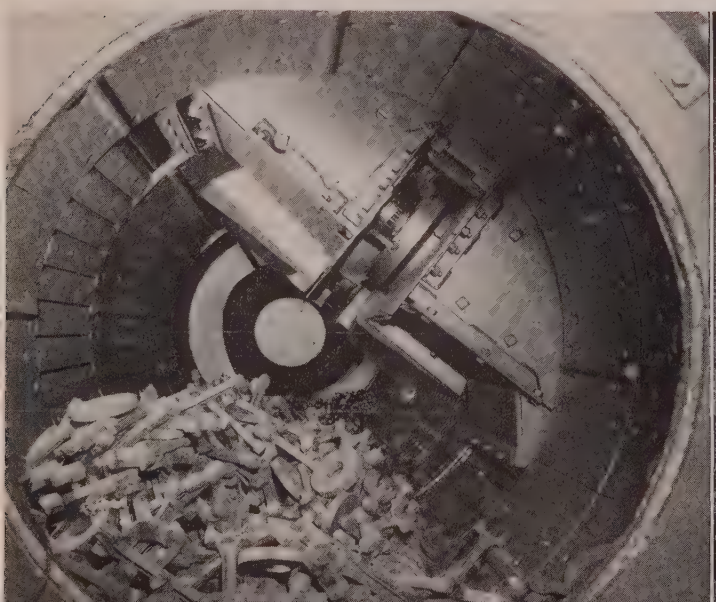
New conveyor-fed blasting system at the Flint, Mich., forge shop uses cut wire shot to clean 12 tons of small forgings per hour

By HERBERT CHASE

TWELVE tons of forgings per hour are descaled by shot-cleaning facilities recently installed at the Buick forge shop. The new Pangborn shot blasting and dust collecting system processes at less cost all types of forgings made in the shop up to 18 inches lo

Crankshafts, camshafts and control arms are adapted to blasting in the 54-inch barrel unit. Neit are parts in which small holes are to be broach

Looking into the drum down which forgings feed over a pair of rubber-covered conveyors. Conveyors conform to the contour of the turning drum



Dumping a load of forgings from a tote box chute feeding a short storage conveyor. Conv speed varies to control feed to the blasting u

e are pickled in umbrella batch-type pickling

incipal advantages of the new facilities are ed labor costs and a lower depreciation rate. tenance costs are also expected to be less. Ma- ng costs on blasted forgings are no higher than were for the same pieces which had been batch- ed.

ocess Conveyorized—Blasting is done on con- rs at two stations within an inclined drum. Forg- are fed to the drum at a controlled rate by a eyor setup built to Buick specifications. In the ing areas, the forgings are tumbled on rubber- red plate conveyors. These conveyors conform e arc of the drum and constantly expose chang- areas of the forgings to the blast. Although the eyors are subject to some deterioration, they not struck directly by the blast if the exposed is covered by forgings, as the layout is designed

rgings to be blasted must be cool and dry. They ork-trucked from the forging area in steel tote Tubs are lifted by an electric hoist and are ed as required into a chute feeding a short -type storage conveyor, driven at a speed which be varied whenever necessary through a gear er.

eed setting determines the rate of feed to the ing barrel, as the storage conveyor discharges the inclined conveyor, which, in turn, feeds barrel. The blast is not turned on until the con- rs below the blasts are well covered with forg-

rough Shot and Scale—Blasting conveyors are ed so that they form in effect a part of the el wall. Forgings feed slowly across the con- rs as the forgings are tumbled and blasted. After ng the blast area, the charge continues down the slowly rotating barrel over areas where scale and wire shot feed out through small holes and go through a separator, the shot being reused and the scale collected.

Dust drawn off by a fan above the barrel is exhausted into the dust collector, falls into hoppers and thence into collection cars for disposal. The whole shot blasting unit is well enclosed so that neither shot nor scale will be able to collect on the floor outside the unit.

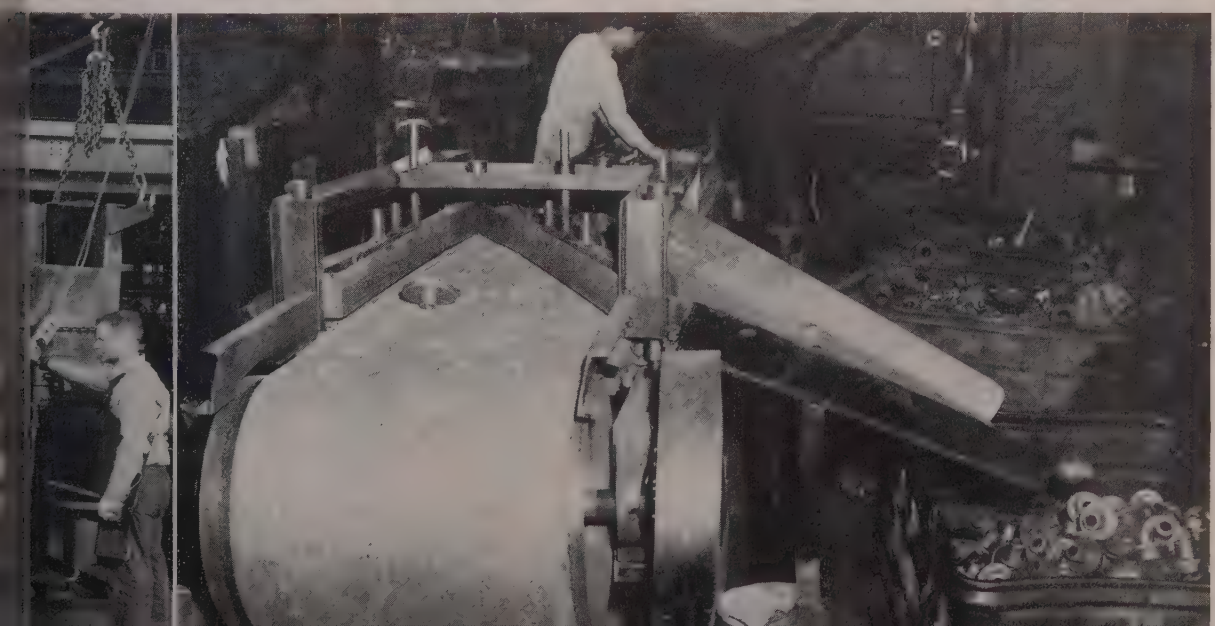
Forgings drop from the lower end of the barrel down a chute and onto a sorting belt. Above the belt are adjustable deflecting gates set to shunt the forgings into chutes feeding into tote boxes that are spotted at each side of the conveyor and also at its end.

With this arrangement, two batches of different sized-shaped forgings can be run at once; a single man at the sorting belt can see that they are deflected into different boxes. Only when more than two different batches come through at one time do any forgings have to be picked off the belt and thrown into boxes. By moving others, usually the heaviest pieces, sidewise on the belt, they are deflected into the right boxes.

Cut Wire Shot Does It—During a recent month, nearly 5000 tons of forgings were blasted in this setup, although it was not kept in continuous use. While running, the rate averaged nearly 12 tons an hour and the cost per ton, including direct labor, power and shot was below 80 cents. The No. 54 cut wire shot consumption runs 1.17 pound per ton of forgings blasted. In one day, an output of 263 tons in 22½ hours running time was attained.

No more than three men are needed at the machine; and their entire time is not required at the rate forgings are presently delivered to the machine. When the machine is running, one man cares for sorting and another tends controls and empties boxes of forgings onto the storage conveyor as needed.

oseup of sorting belt onto which blasted forgings e fed by chute at the drum outlet, top center. Adjustable gates deflect the forging into tote boxes



MOLYBDENUM PLATING —Answer to Lo

Three types of coatings produced in research study. Best adhesion on steel obtained with intermediate layer of nickel

PHYSICAL and chemical properties of pure molybdenum metal, among them its high melting point (4725° F), resistance to chemical corrosion and particularly its high-temperature strength, make it a logical choice for many present-day applications, notably military. High cost and limited availability so far have ruled out any extended use, but some metallurgists have seen the possibilities in coating other metals or alloys with an adherent nonporous layer of molybdenum in suitable thickness.

The idea, still in the laboratory stage, was elaborated on at the recent American Society for Metals meeting in Chicago by W. J. Childs, associate professor of metallurgy, Lafayette College, Easton, Pa.; J. E. Cline, physical chemist, division of industrial co-operation; W. M. Kisner, research assistant, department of metallurgy, and John Wulff, professor of metallurgy, Massachusetts Institute of Technology, Cambridge, Mass.

They believe molybdenum-coated articles might well be used as economical substitutes for those made entirely of molybdenum, and in some cases the physical properties might even be superior to those of pure molybdenum. Since the fabrication of the metal is rendered difficult by the metalworking necessary to impart adequate ductility, a further advantage may be realized in molybdenum coating a basic metal which can be more easily fabricated.

How They Did It—Plating of molybdenum by the hydrogen reduction of molybdenum pentachloride vapor was studied by the four research experts. Their apparatus was designed so that the following six plating variables could be controlled: Temperature of the specimen, rate of flow of the vapor, pres of the vapor, composition of the vapor, duratio the coating process and the composition of the b material. In the apparatus constructed, the r of pressures was from 10^{-5} millimeters of mer to atmospheric, and the maximum temperatur the specimen was 2010° F.

Molybdenum pentachloride was prepared by i ing chlorine over powdered molybdenum meta 570° F. The apparatus was entirely of glass desi so that the molybdenum pentachloride could be pared, resublimed and transferred to the pla apparatus without coming in contact with the at sphere. By this technique chlorine and oxychlo of molybdenum were removed from the pentachlo and reaction with moisture in the atmosphere prevented.

Apparatus for plating on small specimens is sh in Fig. 3. The sealed capsule containing the re limed pentachloride was attached to the appar and a magnetically-operated hammer, made of enclosed in glass, was placed in position to open capillary seal when necessary. That part of apparatus between the two stopcocks then coul evacuated and tested for leaks with a high-frequ discharge.

The pressure head of the incoming hydrogen maintained at 13 millimeters of mercury by a sure stabilizer consisting of a glass piston fi loosely in a glass cylinder. The flowmeter, sh in Fig. 3, contained dibutyl phthalate as manon liquid and calibrated in liters per hour at atmosp pressure. The hydrogen was passed through cc gauze at 930° F to remove any oxygen. Rate of of the hydrogen was controlled by a stopcock. W vapor or any other condensable impurities wer

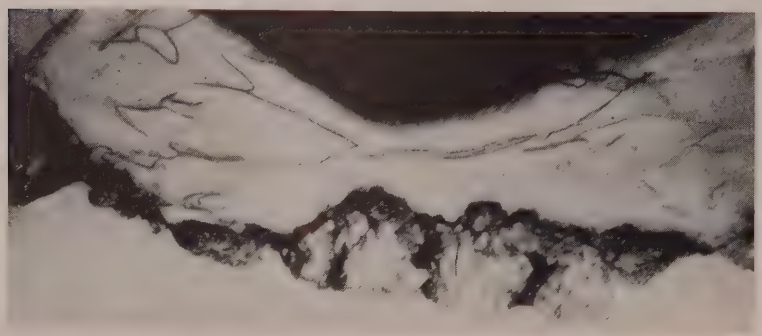


Fig. 1 (above)—Effect of chisel impression on coarse-grained deposits. Upper light zone deformed, coarse-grained molybdenum; center zone fine-grained; lower zone nickel. X500

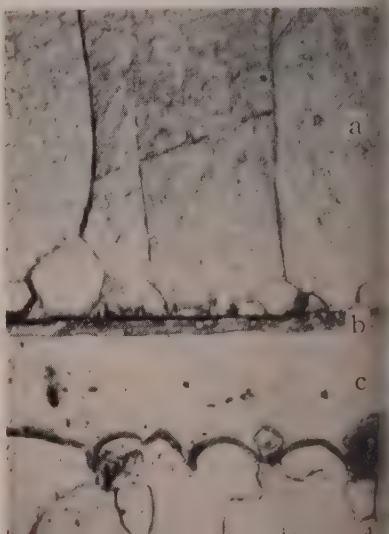


Fig. 2 (right)—Molybdenum on nickel-plated low-carbon steel. (a) Molybdenum; (b) diffusion layers; (c) nickel; (d) low-carbon steel. X1000

...c from the hydrogen in a trap immersed in ...nitrogen.

...rise Control of Apparatus**—To introduce the ...lenum pentachloride into the vapor stream ...pillary seal was broken by the magnetically-...ed hammer. The pentachloride was then sub-...dinto the hydrogen stream by raising the tem-...tre of the heater to about 85° C above that of ... thermostat. In this way some of the penta-...e was removed from the vapor in the tubing ...ed in the oil thermostat, and the vapor mixture ...ontained the equilibrium partial pressure of ...hloride.

...veen the thermostat and the plating zone a ... sleeve was used to prevent precipitation of ...ntachloride. The specimen to be plated was ... in a fused-quartz tube which was connected ...1 ends to Vycor glass. The Vycor tubes were con-... to the Pyrex portion of the apparatus through ... Pyrex seals.

... specimen was heated by a high-frequency in-...1 coil operating from a spark generator. Tem-...re of the specimen was determined by an optical ...eter in the range above 1470° F. Below this, ...nperature was controlled by the current in the ...on coil, using a calibration chart. To avoid ...mination of the vacuum pump, the products of ...ating reaction were condensed out in a second ...

...sure of the vapor mixture had a strong in-... on the molybdenum plate. At atmospheric ...re, it was necessary to keep the partial pressure ... pentachloride below 1.5 millimeters to avoid ...ive formation of powdery, nonadherent de-... Under these conditions molybdenum coatings ...be obtained at temperatures as low as 930° F, ...ly slow rates of plating were achieved.

...pressures of 20 millimeters of mercury and ... molybdenum plates were obtained from 1470 ...0° F, and no difficulty was experienced with ... formation. The partial pressure of hydrogen ...nerally about ten times that of the pentachlor-...having a large excess of hydrogen over that re-... for complete reduction to the metal. At a ...re of 5 millimeters a plating rate of 0.020-...er hour was reached at 1650° F, and a rate ...05-inch per hour at 1470° F.

...ge from Fine-Grain to Laminated—Three dis-...ypes of structure were found in molybdenum ...gs deposited under different conditions. These ...ures are referred to as: (a) Fine-grained, (b) ...-grained and (c) laminated. The fine-grained ...lenum was deposited at the lower tempera-...about 1110° F. The coarse-grained deposit was ...l at temperatures of about 1560° F and higher

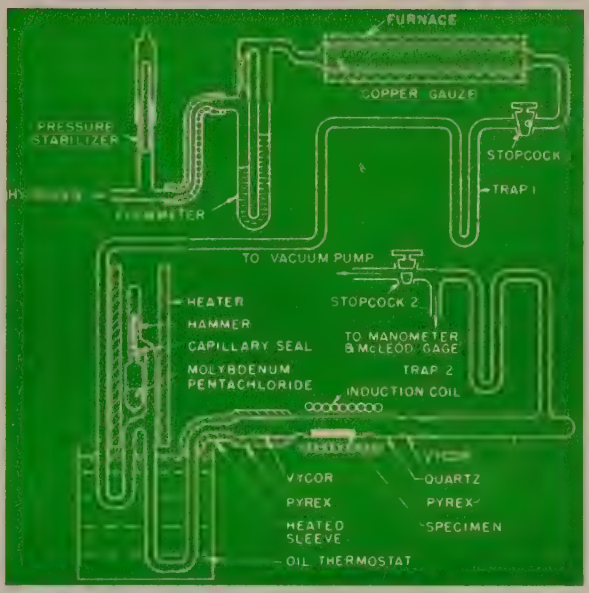


Fig. 3—Apparatus used for the vapor deposition plating of molybdenum

and at total pressures below 25 millimeters of mercury. Laminated structures developed at intermediate temperatures.

Of the three types of structure, the coarse-grained had the best properties. Its superior ductility was demonstrated by driving a chisel into the plate containing both coarse and fine-grained coatings. As can be seen in Fig. 1, the originally columnar grains of the coarse-grained deposit were greatly distorted by this test. The fine-grained deposit, on the other hand, was broken up into a number of smaller sections, and there is no indication of plastic deformation. Similarly, in measurements of hardness, a series of cracks radiated out from the impression made in the fine-grained deposit.

Even in the coarse-grained deposit the strength was better in compression than in tension. For example, when a molybdenum-coated specimen was bent with the molybdenum on the outside of the bend, the tensile forces caused the plate to crack along the grain boundaries. It was believed that the columnar structure decreased the strength of the plate in tension, and some attempts were made to improve the structure by cold working the plate followed by an anneal to cause recrystallization. Due to the brittleness of the plate, sufficient cold working was not obtained. Hot working the plate may offer a better opportunity for improvement of the structure.

Bend To Test Adhesion—In applications where the molybdenum-coated article must withstand mechanical or thermal stresses, the adhesion of the molybdenum to the basis metal is of utmost impor-

tance. As a qualitative test for adhesion, the plated specimen, ⅛-inch thick, was bent to an angle of 90 degrees with the coating on the outside. The tendency of the plate to spall off was then observed. Although cracking of the coating under the tensile stresses always took place, no spalling of the plate was observed in the most favorable cases.

The cleanliness of the metal to be coated was not found to be a determining factor in securing adequate adhesion. The specimens were cleaned with emery paper and given a preliminary treatment at the plating temperature with hydrogen to reduce surface oxides.

The intimate contact of the molybdenum coating with the base metal was indicated by the absence of voids or inclusions at the interface and by interdiffusion between the molydenum and the basis metal. Although in some cases a rough finish of the basis metal gave slightly better adhesion of the plate than a smooth finish, it was found that the most important factors in securing good adhesion were the kind of basis metal and the amount of interdiffusion with the molybdenum deposit.

Nickel Interface Is Helpful—Adequate adhesion of molybdenum on steel was accomplished by first electrodepositing a layer of nickel on the steel before depositing the molybdenum from the pentachloride vapor. A cross section of this type of plate is shown in Fig. 2.

Since there are no intermetallic phases formed in the interface between nickel and steel, the interdiffusion produced a solid solution with a gradual change in composition. This forms an excellent bond between the nickel and steel at the plating temperature used in depositing the molybdenum. The excessive formation of intermetallic compound between the steel and molybdenum was eliminated by the nickel layer, leading to an adhesion much superior to that found without the intermediate layer of nickel.

When molybdenum was deposited on copper, there was no appreciable amount of interdiffusion and the adhesion was poor. However, the addition of 5-10 per cent nickel to the copper gave an alloy on which the coating of molybdenum adhered as well as on pure nickel. The possibility exists that copper might be useful in reducing the formation of intermetallic phase between steel and molybdenum, and that an improvement in adhesion would come about in this way.

Ford Installing 17 New Test Dynamometers

A MILLION miles of "electronic highway" squeezed into a single building is being added to the engine testing, research and development facilities of Ford Motor Co. at Dearborn, Mich. Now being built by the Westinghouse Electric Corp.'s Buffalo, N. Y., plant, the added "highway" won't be actual roadway, of course, but for its job it will be even better than the real thing.

The equipment will enlarge present test facilities in the new dynamometer building of the Ford search and Engineering Center, and includes 17 namometers, all complete with fully electronic trols and motor-generator sets. It represents largest single order Westinghouse ever has rec for dynamometers.

Manufacture of the equipment already is u way and the first units will be shipped early in year. All the equipment will be shipped before May.

Actually special electric generators that ca used either as generators or as motors, the dynar eters are designed specifically to test engines, t missions, axles and completed cars and trucks.

Eleven engine-test dynamometers will be l each capable of turning at speeds up to 6000 and rated at 200 hp.

Runs at High Speeds—One 250-hp unit, rate speeds up to 6000 rpm has been designed to test t missions and torque converters used on Ford, Li and Mercury cars. This equipment determine curately the efficiency of the transmission and, important, just what strains and stresses are posed on the various parts in the course of nc driving.

For testing axles, there will be three dynamom one a 400-hp unit, rated at 1500-4000 rpm, two o 150-hp each 400-1600 rpm.

In operation the 400-hp dynamometer will d power to axles through a driveshaft and star differential gears just as power normally would to the axles of an actual automobile. A 150-h namometer will also be mounted on each axle, simulating the car's wheels. These smalle namometers will hold back, or resist the flo power from the main unit, thus putting a load o differential gears.

Measures Wear—Knowing the amount of pow ing supplied by the 400-hp unit and the an of drag from those mounted on the axles, engi can measure the wear and efficiencies of the ax sembly under various controlled conditions. B versing the process they can find out what ha in the axle assembly when the car is going dow with the engine acting as a brake. For testing pleted cars and trucks, there will be two 2 dynamometers and mechanical roll assemblie which the vehicles will be tested at simulated s up to 100 miles an hour.

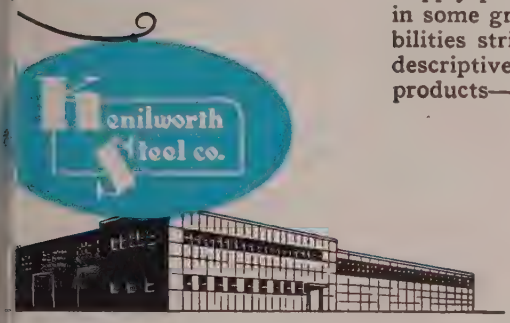
With this apparatus the front wheels of a c truck will be blocked securely in place and the driving wheels each will rest on a fiber roll 4 f diameter and 3 feet long. The two dynamom are connected to the big rolls in such a fashio one or both of the units can be used as desire providing up to 400-hp on a single shaft.

Varying the loads on the rolls, and makin car's engine work harder, simulates hills whose ness depends on the amount of power fed t rolls. Speeding up the rolls to overtake the v sends the car dashing down a synthetic grade. wheel plates can be added to the rolls to rep various car weights. There's even provision for lating wind resistance at high speeds.

ns of

warehouse service

These three steel warehouses normally carry in stock the complete range of cold rolled strip steel specialties made by The Cold Metal Products Company, including low carbon and high carbon analyses, tempered spring steel and stainless grades in the 300 and 400 series. Supply problems are now very difficult. Currently, shortages exist in some grades and sizes, but within the limits of inventory possibilities strip steel fabricators continue to find justification for the descriptive phrase long identifying all Precision produced CMP products—"More feet per pound—more finished parts per ton."



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'50 Research Pays Off

RESEARCH and engineering to the tune of $50 million during 1950 produced definite technical progress for Westinghouse Electric Corp. engineers and scientists working against a background of increasing national preparedness.

New developments ranged from larger power giants for the utility industry to a new vacuum gage that "measures nothing better than anything," according to A. C. Monteith, Westinghouse vice president.

"Our research and engineering program during 1950," he declared, "was the largest in the company's peacetime history, more than $50 million being spent in exploration of new fields, in development of new products and improvement of existing equipment and in design of custom-built apparatus.

"At the same time, our entire research and engineering staffs have been on virtual 'alert' as national defense requirements increase," the executive added. "Like our manufacturing groups, they are prepared to make a quick changeover in the event of full-scale mobilization. Of course, even during 1950 a great deal of research and development effort has gone into military projects."

Research Increased During '50—Scientific progress during 1950 was reported for the company by Dr. J. A. Hutcheson, vice president and director of research. Again emphasizing that defense factors may change the picture, he disclosed that "fundamental research" —that quest for entirely new ideas—has been on the increase, with important investigations being made of super-cold phenomena, corrosion factors, gas discharges, and many other still baffling regions of science.

"On the more practical side," he said, "our scientists have developed a new x-ray image amplifier for brighter fluoroscopic images to the near-commercial stage, have discovered a new way to increase hardness of stainless steels by 300 per cent, and are hard at work in the field of color television."

Heading the list of engineering contributions during the year was the design of several huge high-speed steam-turbine generating units. With the demand for electric power increasing by leaps and bounds, company engineers responded with construction of generators delivering 150,000 kw, sufficient power to supply the needs of an entire city. This was an increase of 50,000 kw over the 3600 rpm generators built only two years ago.

Power Giants Being Built—Thirty-five generators with capacities of 100,000 kw and over now are under construction at Westinghouse. In several cases, units ranging above 150,000 kw are being seriously considered by engineers.

In the field of transportation, a brand new type of electric locomotive was introduced by company engineers. Its "heart" is an electronic tube—the ignitron —which converts alternating current into direct current. Measuring only eight inches in diameter and 30 inches high, it was developed many years ago by Westinghouse engineers, but reached its peak use during World War II when it speeded productio aluminum and magnesium.

When applied to electric locomotives, the ign makes possible the most economical conversio high-voltage alternating current from overhead to direct current to run heavy-duty driving m on the wheels. Successful performance of the tron on test runs this year led to an order fo 6000 hp electric locomotives for the Pennsyl railroad. Each locomotive will have two 3000-h power units and 12 driving axles. The igni weigh only one quarter as much and are far complex than the motor-generator equipment would otherwise be necessary to convert altern into direct current.

Gas Turbine Locomotive Tested — Company neers also this year completed construction of a perimental 4000-horsepower gas turbine-electr comotive and put it through miles of test ru tracks in western Pennsylvania. In this unit turbines are used to drive generators that feed tric power to motors on the wheels.

Production of jet engines for the militar creased significantly during 1950 with the sta operations at the company-operated plant near sas City, Mo., the year's engineering report disc Improvements added by their engineers hav creased the "flying time" of large jet engines point where the interval between periodic e overhauls is longer than the average time fo respondingly large propeller-driven planes.

In the field of atomic power, the company's gram for development of a nuclear power pla

More Scarfing Heat, Less Powd

Finely divided iron powder blown into the oxygen of this blowpipe burns in the oxyacetylene preheat when heated to ignition temperature, creating the hi perature and slagging action needed to scarf s steel. A development of Linde Air Products Co., Ne the Oxweld FSP-2 powder-scarfing blowpipe incor an arrangement for external powder feed and m pass 2 to 2¼ inches wide. Due to increased speed model, less powder is used per square foot of scar face. For a 1½ ton slab, the company reports th sumption of powder has been decreased from 25 pounds

s moved ahead with the letting of contracts for construction of facilities at a "proving ground" Idaho Falls, Idaho. The project is being carforth under Atomic Energy Commission contract in co-operation with Argonne National Laboratory. Meantime, scientists at the research laboratories made still deeper penetration into the secrets pounding the latent power of the atomic nucleus.

New Materials for New Jobs—Also revealed in the report was the development of a wide variety of new materials for research and engineering purposes.

From the company's Transformer Division at Sharon, Pa., came a unique three-decker paint "sandwich" that stands up under anything nature can put out, including sub-zero cold, desert heat, fog, mist and salt-spray. Working "three musketeer" fashion—all for one and one for all—the new coating will more than double finish life on distribution transformers and help reduce the nation's $3 billion annual cost of corrosion. Key to success of the new coating system is the middle layer, made up of mica flakes embedded "shingle roof" fashion in a syrup-like plastic.

A radically different application was a new transparent plastic—capable of being made into three-dimensional models of machine parts and tools—which made its debut in military, industrial, and university laboratories here and abroad. Developed at the Westinghouse research laboratories, the "photoplastic" is aiding scientists in gun factories, airplane engine plants, arsenals, naval laboratories, and universities in the design of stronger machinery and equipment. King-size, three-dimensional models cut from photoplastic enable scientists to get a "portrait in color" of the strains encountered in tools, machine parts and other objects.

Handling of bigger generators to meet the nation's growing demand for electricity now is possible due to development of a new electrical insulation that will last at least 10 times longer than previous insulations under conditions of severe electrical stress, a report revealed.

Called Thermalastic, the new insulation consists of mica flakes embedded in a heat-resistant plastic with enough "stretch" to expand and contract with the heating of coils. Under test, the material proved superior to previous insulations in nearly every physical, chemical, and electrical respect.

Super Steels Produced—A low temperature treatment at 300 degrees below zero F—was the strange weapon taken by company research scientists to achieve super steels 300 per cent harder than the best commercially available. Working with engineers of the Timken Co., Chicago, the scientists discovered that if steel is first immersed in a bath of liquid nitrogen, then rolled or forged, and finally heat treated, its hardness is increased three times. The superhard steel should find many applications in bearings, gears and other wear-resistant applications.

In the realm of the supersensitive, Westinghouse engineers came up with the near ultimate in a gage that measures nothing better than anything." It is an electronic device that measures pressures that is lower than any heretofore achieved, and is so sensitive that it can detect the presence of air in a vacuum system in which only one air molecule remains out of every 10 thousand billion originally present. It is aiding scientists in their study of atomic behavior.

Removes Rust, Stops Corrosion

Capable of removing existing rust and preventing further rusting of the cleaned surfaces for considerable time is Metacon 520, a material developed by Croda Ltd., Snaith, Yorkshire, England. It is said to condition the metal so that subsequent painting, galvanizing, enameling, and cellulosing have improved adhesion to that surface.

Other than a lead lined, stoneware, enameled or stainless steel tank to hold the fluid, no special equipment is needed for its application. If excessive oil or grease is present on the surface, it should be removed prior to cleaning with the compound, the company states. Application is by dipping the parts at elevated temperatures, reported to be most satisfactory between 50 and 60° C.

Light rusting may be removed without heating the solution. For deeply pitted material, an immersion of 9 to 12 minutes at the elevated temperature is recommended, but where slight rusting is involved or where the main aim is to deposit a rust preventive film 2 to 3 minutes reportedly is sufficient.

Milling with One Pass Easy

No operating difficulty has been experienced at General Electric Co., Fitchburg, Mass., by replacing a two-pass milling operation on a turbine part with a one-pass operation using a simple step fly-cutter. The four-bladed fly-cutter, using standard Carboloy lathe tools in an old fly-cutting head, is said to have reduced tool grinding and resetting costs at the Turbine Division plant.

Machining is performed in a Sellers horizontal mill with 5-inch spindle driven by 15 hp motor. The new step-cutter removes ½-inch of material, the tools being set so the cut is broken up in four ⅛-inch steps. Under the former method, the cutter is said to have stalled frequently while taking the cut in two passes.

Present setup is stated to produce a good finish while the tools need sharpening only once in 8 hours. Cutter diameter is 14 inches, while radial depth of the slots in the fly-cutting head progress 0.050-inch per slot so that each tool cuts a separate circular track.

Eliminate Outside Interferences

Improving performance of communications equipment by shielding it from outside interferences is a new sheet metal for the electronics field, produced by American Cladmetals Co., Carnegie, Pa. Consisting of a magnetic base, clad on each side with a nonferrous conductor, Electroshield metal is made in light and heavy sheets up to about 35 square feet in area.

Its effectiveness in providing clearer reception and transmission is said to be noticeable in the lower frequency ranges now employed in electronic equipment of advanced design. The shielding of instruments to reduce interferences and improve transmission has been receiving more attention.

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CIRCO OILS—Straight mineral oils for general lubrication of indu machinery. Unsurpassed for once-through applications, regardless of erating temperatures.

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STEAM CYLINDER OILS—Lubricants of high flash and fire point for rated or superheated steam conditions and for worm gear speed-red units.

SUNOCO WAY LUBRICANT—Eliminates "stick-slip" of tables and s of ways. Noncorrosive, with outstanding metalwetting and adhesive p ties, ample viscosity and E.P. qualities. Approved by 36 leading m tool manufacturers.

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NING MACHINE LUBRICANT—Semifluid. For use where a light esive grease is required. Resists separation and decomposition.

LLER BEARING GREASES—For use on electric motors and genera- high-temperature machinery equipped with ball or roller bearings.

EAR COMPOUNDS—Black adhesive open-gear compounds and ble greases. Recommended for power presses, mining machinery, duction mills, crushers, pump gears, etc.

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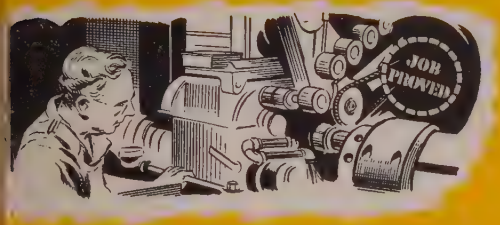

Ball bearing manufacturer finds that Sunicut increases tool life 15%, eliminates sludging.

JT—Straight (non-emulsifiable) transparent cutting oils. Various for automatic screw machines and heavy-duty machining operations. high speed production with excellent finishes, long tool life.

O EMULSIFYING CUTTING OIL—An emulsifiable oil which pro- stable white emulsion. Efficient and economical cooling and lubri- medium for turning, milling, drilling, and other metalworking ons on both ferrous and nonferrous metals. It is also an excellent coolant. Available in heavy-duty grades too.

UENCHING OILS—Specially refined oils designed to aid develop- maximum physical properties in a wide variety of steels.

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OLLING OILS—Straight and emulsifying oils which will permit m production in rolling steel, aluminum, brass, and copper.

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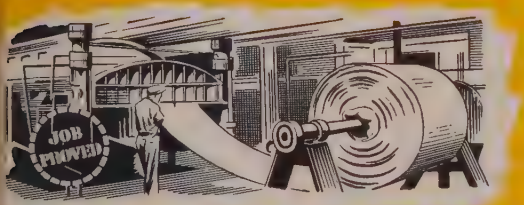


Two Sun rubber-process aids save manufacturer $6,000 a year by taking the place of five competitive products.

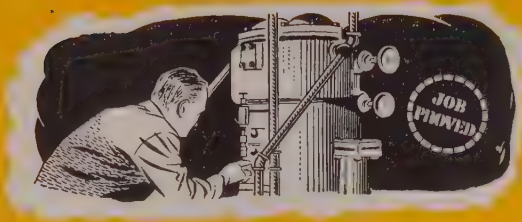
SOL-2XH—An elasticator and process aid for natural rubber and lly for GR-S. Outstanding for sponge rubber.

LIGHT PROCESS-AID—A processing agent and excellent softener ural rubber, natural rubber reclaims, and neoprene synthetic rubber. or GR-S to some extent.

EX-53—An inexpensive product suitable for processing GR-S and of GR-S and natural rubber. An established process aid for rubber ar stocks and semihard rubbers.

MAR-5AA—A dark-colored product for processing natural and rubber used in tire-making. Also used in reclaiming natural-rubber Replaces asphalt fluxes. Free-flowing at room temperature.

REFRIGERATION OILS



Hotel turns to Suniso for its ice-making equipment; eliminates separation troubles, cuts oil costs 20%.

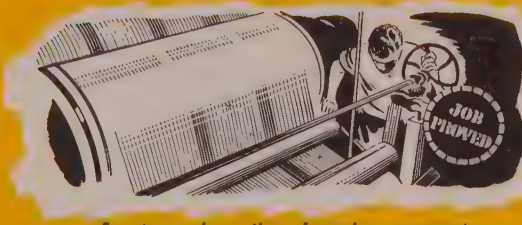
SUNISO REFRIGERATION OILS—High-quality oils having extremely low pour points, extremely low wax-separating characteristics, a high degree of stability, and long life. Initially neutral and resistant to formation of detrimental acids. Suniso grades are available to meet all low, normal, and high temperature conditions. The most widely used oils in refrigerating and air-conditioning.

SUNOCO WAXES

Waxes, "tailor made" to provide the exact properties demanded by different industries, are now available from Sun's new multimillion-dollar wax plant. Revolutionary manufacturing methods make it possible to retain only the wax portions desired for a particular use, while discarding those which might be detrimental.

Sunoco Waxes are precision-controlled for quality and uniformity of *all* physical and chemical characteristics important to the user. The various grades of Sunoco Wax are recommended on the basis of their ability to give superior performance *on the specific job.*

TEXTILE OILS



Sunotex replaces three formula components in textile mill; also saves 25% on costs.

SUNOTEX TEXTILE-PROCESS AIDS—Designed to impart desired additional properties to various fibers during their processing from the raw state into a manufactured product. All Sunotex textile-process aids are emulsifiable in water. Highest rating in Fade-Ometer tests.

SUN COTTON CONDITIONERS—Processing materials which prevent waste by cutting down excessive amounts of fly (fine air-borne lint particles).

SUN ASBESTOS FIBER CONDITIONER—Sprayed on asbestos during processing to keep fibers from being damaged or broken down. Harmful dust is minimized when this product is used.

SUN CORDAGE OILS—Generally used alone, but adaptable to various formulas used by cordage manufacturers. Selected products, highly compatible with additives.

SUNOTEX MACHINE OIL—One lubricant for nearly every kind of textile machine. A high-quality mineral oil and additive combination which prevents rust, clings to moving parts, and minimizes wear. Scours out of *all kinds* of fabrics easily and completely.

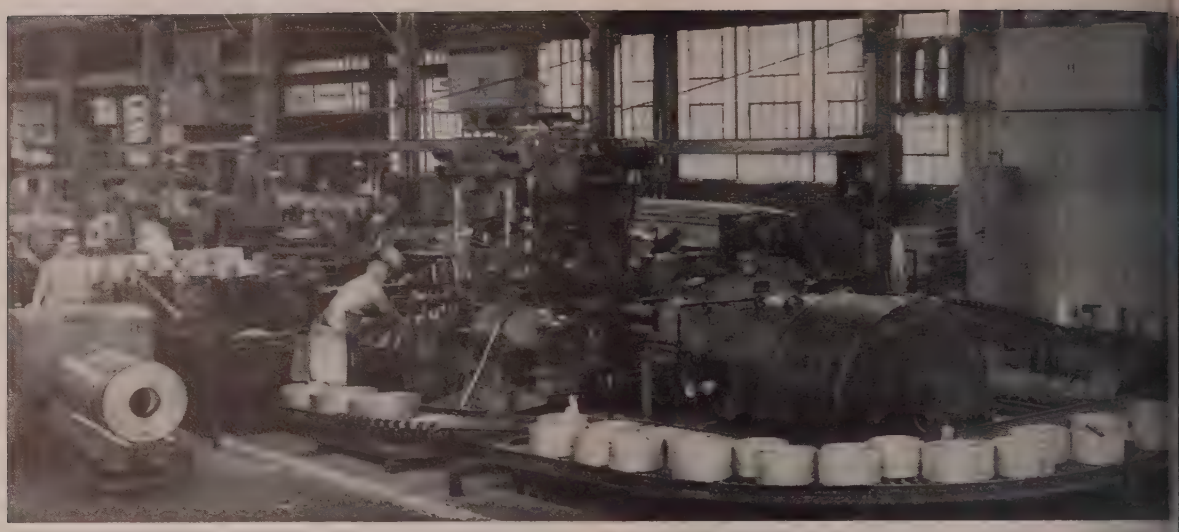
ADDITIONAL INDUSTRIAL PRODUCTS

SUN SOLVENTS—Sun Spirits for the thinning of paints, varnishes, and enamels, for metal-cleaning, and certain types of processing and extraction . . . a pure, water-white petroleum solvent free of corrosive sulfur. Other Sun solvents with special properties are available for the chemical industry.

SUN LEATHER OILS—Petroleum-base leather oils. Used for obtaining the desired tensile strength, proper temper, and controlled moisture content. Maintain a light even color, mix well, and distribute evenly.

NDUSTRIAL PRODUCTS

SUNOCO



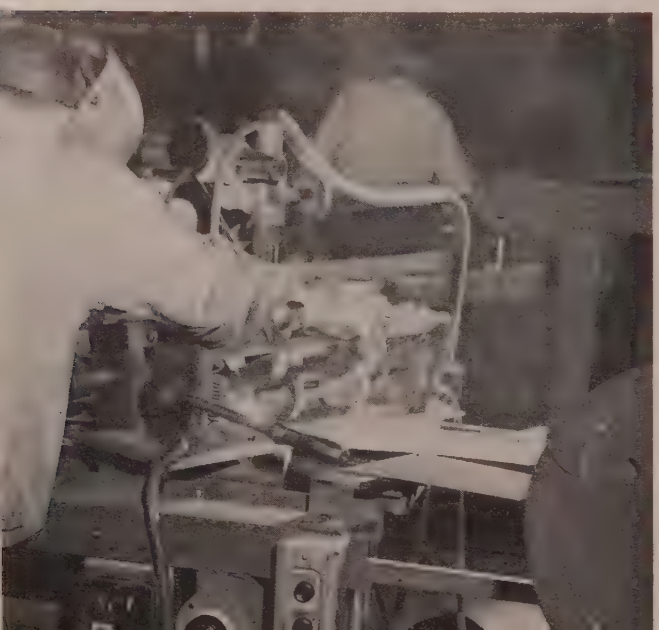
This 4-high mill rolls coils up to 14 inches wide, processing three times as much stock as any other mill in the strip department

Nonferrous Strip Capacity Expanded

By installing two new 4-high mills, an automatic coil-welder, continuous pickling systems, improved inspection techniques, better materials handling equipment and by rearranging its entire shop, Riverside Metal is gradually pushing up production of much-needed rolled copper and nickel alloys

By W. BOMBOY
Plant Superintendent
Riverside Metal Co.
Riverside, N. J.

TO MEET the growing demand for phosphor bronze, nickel silver, cupro nickel and beryllium copper alloys, Riverside Metal Co. is increasing its strip mill production. The company is currently installing new processing equipment, developing a more efficient strip mill layout and introducing better handling and production techniques.



More Rolling Capacity — Rolling capacity boosted with the recent installation of two new high mills. One rolls coils up to 14 inches w the other up to 8 inches. The larger 4-high, by ing greater pinches and operating at higher spe rolls three times as much stock as any other now in the strip department. This mill requires three men to operate—one to operate the cont one to feed strip, and one to remove rolled st

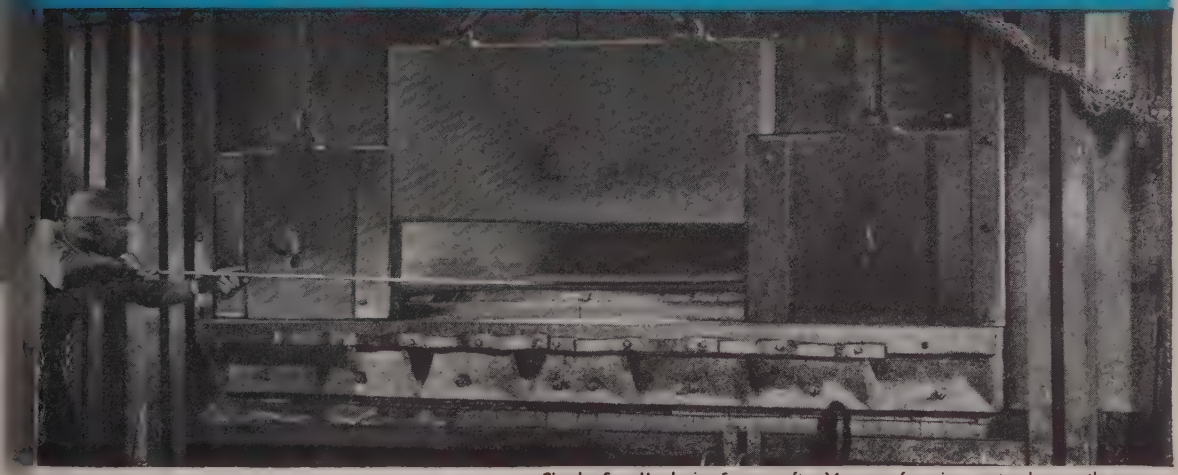
Quality of finished stock is greatly improved. two back-up rolls prevent the rolls in contact the strip from bending and hence eliminate the cr which tends to form on stock rolled between only rolls.

Coils are welded together end to end to mak possible to feed a few large coils to the mill ra than numerous smaller coils. This reduces hand decreases idle time and supplies customers longer coils.

The large mill is equipped with a conveyor sends stock to be rerolled back to the feeding sid the machine and conveys finished stock to a take

An automatic welding machine supersedes han methods, increasing the number of welds produce by more than 50 per cent. Ends of coils are cut an welded on a bias to give a longer and stronger wel

Not One Cent for Maintenance IN 14 YEARS OF SERVICE



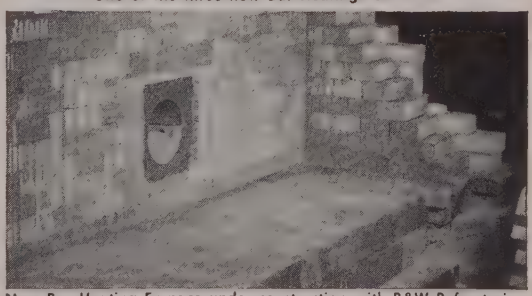
Circular Saw Hardening Furnace after 14 years of service—center door partly open.

THAT'S THE RECORD of B&W Insulating Firebrick in Henry Disston and Sons, Inc. circular saw hardening furnace. During 14 years, this furnace handled hundreds of tons of high grade steel. *In spite this grueling punishment, the original walls and roof of B&W Insulating Firebrick are still giving excellent service.*

B&W IFB not only made possible continuously high production, but also assured better quality control . . due to the quick response of this brick to temperature changes. And because B&W IFB have such very high insulating value, the fuel savings over the 14 year period were appreciable.

Performance pays off. As a result of this performance, Disston has since lined ten more furnaces of different types with B&W IFB. If you, too, want to increase furnace operating efficiency and lower production costs, discuss your refractory problems with your local B&W representative.

One of the three new Bar Heating Furnaces.



New Bar Heating Furnace under construction with B&W Refractories.

Furnace Specifications

Span of arch 13 ft. consisting of 9 in. K-26 IFB

Length of furnace 15 ft. 6 in.

Height of furnace from hearth to top of arch 2 ft. 6 in.

Side walls and doors 9 in. K-26 IFB

B&W

BABCOCK & WILCOX

THE BABCOCK & WILCOX CO.
REFRACTORIES DIVISION
GENERAL OFFICES: 85 LIBERTY ST., NEW YORK 6, N.Y.
WORKS: AUGUSTA, GA.

R-367

REFRACTORIES PRODUCTS — B&W 80 Firebrick • B&W Junior Firebrick • B&W 80 Glass Tank Blocks • B&W Insulating Firebrick Refractory Castables, Plastics and Mortars • OTHER B&W PRODUCTS — Stationary & Marine Boilers and Component Equipment . . . Chemical Recovery Units . . . Seamless & Welded Tubes . . . Pulverizers . . . Fuel Burning Equipment . . . Pressure Vessels . . . Alloy Castings

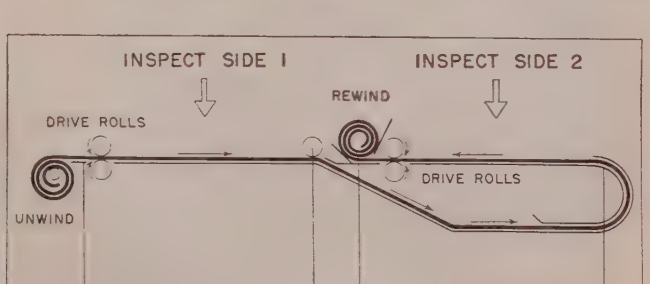
Continuous pickling systems will eliminate this kind of tank-to-tank pickling. Coils will unwind at one end of the tanks, be drawn through the tanks and rewound at the other end

point. Compressed air-operated sections of the conveyor up-end and down-end coils when entering and leaving the mill.

The pony mill now rolls narrow strip previously rolled in the same mills as wide strip. This permits the larger mills to be used to their full capacity for wide stock.

Coils Welded Automatically—An automatic welding machine speeds coil-joining. This machine supersedes hand methods and has increased the number of welds produced by more than 50 per cent. Further, quality of the weld is improved. The new machine comprises two clamps, which hold the coil-ends in place, and roller-mounted welding apparatus which travels above the clamped ends along an elevated structure to make the weld. Ends of the coils are cut and welded on a bias to give a longer and stronger weld. A new conveyor is being constructed from the welding machine to the large 4-high mill to eliminate placing coils on trucks for the short haul to the mill.

Continuous pickling systems are being installed to eliminate handling coils from tank to tank. Coils will unwind at one end of the pickling tanks, be drawn through the tanks, and rewound at the other



By guiding the strip as shown here, both sides are inspected in one operation, eliminating both turnovers and rewinding. Inspection time is cut 25 per cent

end. A better pickling job will be obtained be every spot on the strip will be exposed to the v solutions. Dipping coils from tank to tank times leaves local areas untreated. Annealin naces already have been installed which ann continuous "flow" of strip.

New Casting, No Cropping—A new casting s is being studied for future installation. This s will eliminate cropping, an operation which n sults in an 8 per cent loss of the bar; decrea depth of the scalping cuts; reduce porosity; casting of longer bars; and decrease handling tions between the foundry and breakdown oper

Present casting operations already have streamlined. Only three sizes of bars are no instead of the two dozen formerly cast. Thi made possible largely by the ability of the new to take large pinches after breakdown.

Formerly, to inspect coiled strip, small coils we wound, inspected on one side, turned over on the side, inspected, and rewound. Large coils were in ed on one side as strip was passed along the insp table to a rewind spool at the far end of the tab coil was then unwound again, inspected on the side and rewound. Now, by guiding the strip sides are inspected in one operation, eliminatin turnovers and rewinding. Inspection time has cut at least 25 per cent.

"Stock Point" Servicing—Until the introd of the "stock point" system, processing of cust orders began in the foundry. Now, a stockpile tially-rolled stock is maintained so when an or received it is necessary merely to roll to the ness specified, slit, cut to size and ship.

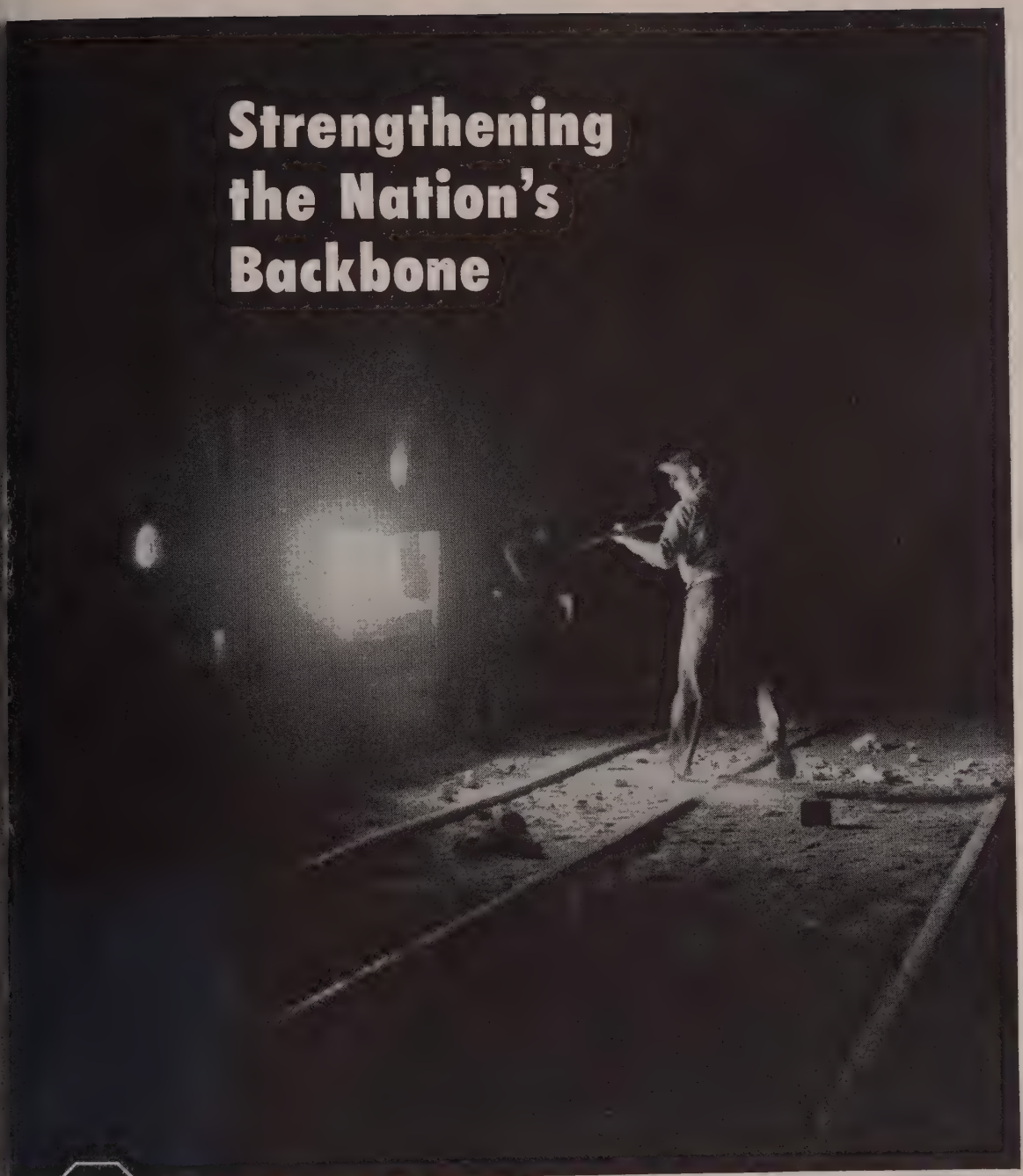
Coils are handled either by trailer-tractor or and-platform-truck. Neither of these method mits tiering. For this reason, a fork-truck-and system is being installed. The fork truck can pallet loads four high to take advantage of air space. Also, those coils now resting o floor will be palletized to eliminate manual l onto and off trailers or skids. The new syste also provide a neater storage area and facilitate ing inventories.

One fork truck is expected to service the point and to carry coils to and from pickling down, ready-to-finish, edge trimming and ann A second fork truck will service final rolling, a ing inspection, slitting, cutting, and shipping.

Shrinks Traveling Distances—To decrease distances between departments, Riverside rel its finishing department, coil and flat shippi partment, saw department, and machine shop. changes now permit material to flow directly one process to the next and eliminate time co ing back-tracking.

Formerly, ready-to-finish strip had to be ported some 400 feet to finishing operations a other 120 feet to the coil and flat shipping ment. To cut these excessive handling distanc finishing department was moved next to the to-finish mills and the shipping department adjacent to the finishing department. Thus, moves from process to process without tra

Strengthening the Nation's Backbone



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GRANITE CITY STEEL
1878

Middle America, backbone of the nation, gets part of its strength from Granite City Steel—main suppliers of quality steel to this area since 1878.

You can depend on Granite City Steel to keep pace with Progress —to continue to be Steel Headquarters for Middle America.

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Ingots • Cold Rolled Coils • Strongbarn Galvanized Roofing and Siding (Patented) Cold Rolled Sheets • Electrical Sheets Tin Mill Products • Electrolytic Tin Plate Porcelain Enameling Sheets • Fabricated Products • Hi-Strength Corruform

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GRANITE CITY STEEL COMPANY, Granite City, Illinois

long intermediate distances. In fact, the 520-foot former distance is cut to 25 feet—a saving of 495 feet per trip or 95 per cent.

Machine Shop in the Middle—The machine shop exchanged places with the finishing department and is now in a central location where it is more convenient to the departments it services. Operations which were formerly scattered throughout the mill—grinding, blacksmith, drop hammer—are moved to the central shop with a resulting decrease in idle time.

The saw department, which finishes slabs, is now 850 feet from the rolling mills and 800 feet from the shipping department. Stock must travel a total of 1650 feet from rolling to finishing to shipping. By moving the saw department next to the rolling mills, this distance will be cut to 160 feet—a saving of 1490 feet per trip.

You Need to Overhaul Workholding Methods

By GUY HUBBARD
Machine Tool Editor, STEEL

MACHINE tools have become so highly developed —so replete with hydraulic, pneumatic, electrical, electronic and complex mechanical apparatus—that there is growing tendency to overlook their basic function.

Therefore, it is well to remember that the basic function today is exactly the same function that it always was. It was and still is, "to bring tools and work into controlled contact for the purpose of removing from the workpiece, in the form of chips, the excess metal—thus producing finished work of predetermined size, shape and finish as rapidly and economically as possible.

Marble or Metal—Like the traditional statue hidden within the rough block of marble, the metal part actually is inside the rough casting, forging or block of metal. The big problem that a machine tool has to solve is to remove in the form of chips the excess metal in which the part is encased.

Like a talented sculptor, a modern machine tool has within itself the ability to do this exacting work, but—like the sculptor—it can do it effectively only when provided with suitable tools and with proper means for holding the workpiece on which these tools are to operate.

The only time when a production machine tool actually is "productive" is when it is producing something. That is when it is removing excess metal. It definitely is not productive when it has been stopped to permit finished parts to be removed and unfinished parts to be chucked or otherwise loaded into the machine.

Materials Handling Vital—Therefore, even if it is highly efficient as a cutting machine, its overall efficiency can be very much less than that of an style machine—if proper materials handling atte has not been devoted to this important busine unloading and reloading it. By the same tok modern, quick-firing cannon with latest typ breech mechanism would make a poor showing i gun crew ignored its breech loading possibilities followed the Civil War tradition of ramming charge through the muzzle.

Many companies now are turning loose crew tool engineers with orders to make plant-wide veys and plant-wide revisions of workholding n ods, to the end that every ounce of productio squeezed out of every machine tool. Results of surveys are astounding. Improvements in pr tion through revision of workholding methods in with latest practice are equally astounding.

For example, substitution of self-centering ch —including collet chucks—in place of indepe jaw chucks, have increased output of engine l and turret lathes as much as 50 per cent in cases. Where gears are being bored or gr equally surprising results have been ach through substitution of special chucks which the gears on their pitch lines, thereby getting in exact relation to the teeth. Incidentally, in these cases, ordinary operators can make s which previously required attention of highly s operators.

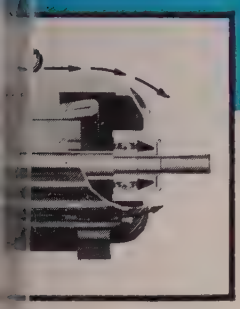
Chalk and Indicators—In general, it can be that critical attention should be concentrated a point in a production shop where operators are f to be using "chalk and indicators" in truing up locating routine work, or where they are empl "tool room methods" for setting up such wor milling machines, drilling machines, lathes, t lathes, boring machines and even planers and sha

In such cases a company in effect is paying fo proper jigs, fixtures and other efficient holdin vices—without having the benefit of them. Th sulting loss of man-hours is obvious, but the e costs through lost machine-hours is somethin more serious in these critical times.

It would stimulate corrective action if every chine had hung on it a sign reading: "My ti worth *blank* cents per minute on this job", the being filled in by carefully figured overall value minute" of its time as a productive tool. In cases this value actually may be in dollars r than cents per minute. Non-productive time often is that costly.

Emergency Dictates Change

Selenium, added to AISI type 303 stainless, nated by Carpenter Steel Co., Reading, Pa., as less No. 8, has become essential in electroni other industries, necessitating a change to sulph the free machining element. The company re that in places where the selenium type is specifi required, it will furnish it on a mill manufac basis as long as it is available. It is making an charge of 2½ cents per pound for selenium until further notice.



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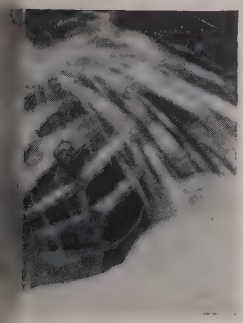


d moisture can't get
Sealedpower motor.
n in an atmosphere
nch chalk, yet not a
inside.

The motor that keeps itself cool and clean...

You'll find it profitable to standardize on the Crocker-Wheeler Sealedpower for all applications that call for totally-enclosed motor in the 2 to 100 hp range. For this C-W motor *assures cooler running with minimum maintenance.*

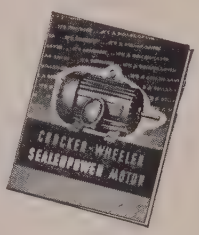
It runs cooler because the distinctive finned housing adds *150% more cooling surface*—and because the integral fan continually blows a stream of cooling air over the entire cooling surface.

As for maintenance—the design is such that dust, fumes and moisture simply can't get inside, while the continual blast of air along the fin surfaces keeps the outside clean. Under normal conditions you never need to shut down an Elliott C-W Sealedpower motor for cleaning.

SEND FOR THIS BULLETIN

It describes all the features that assure you of *top performance with rockbottom operating and upkeep costs* from every C-W Sealedpower motor you install. Write today and ask for Sealedpower Bulletin SL-300-2A. Address your request to *Elliott Company, Dept. S. Jeannette, Pa.*

The Elliott C-W Sealedpower motor is available also in explosion-proof construction. Bulletin SL-300-5 covers this type. Copy on request.



Crocker-Wheeler motors range from 1 to 200 hp. Larger Elliott motors and generators are built by the Ridgway Division in Ridgway, Pa.

CW-19

ELLIOTT COMPANY

GENERAL OFFICES & MAIN PLANT—JEANNETTE, PA.

CROCKER-WHEELER DIVISION

Ampere, N. J.

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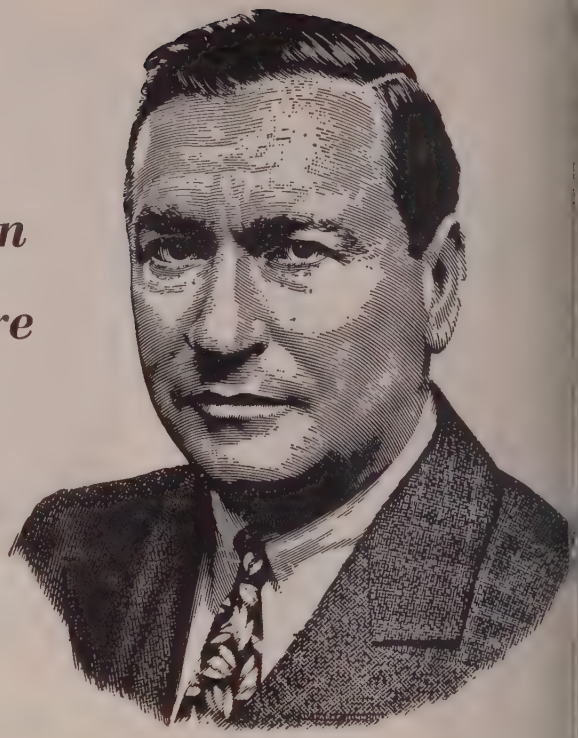
"You Build for your own and your country's future when you save..."



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President, U. S. Steel Corporation

"A free economy, such as ours, is built on the savings of the people. And the future security of America depends on the initiative and the growth of every citizen. We in U. S. Steel encourage our employees to join the Payroll Savings Plan, and we are proud that the National Tube Company, one of our subsidiaries, was the first of the large industrial companies of the nation in 1950 to have more than 80% of its employees participating. Remember, you build for your own and your country's future when you save."

Mr. Fairless is not expressing a personal opinion, nor is he speaking for other far-seeing executives when he tells you that our economy is built on the savings of the people and a man builds for his own and his country's future when he saves.

Actually, Mr. Fairless is merely putting in words the thoughts and action of the millions of employed men and women who *now hold* more than 50 billion dollars in U.S. Savings Bonds.

$50,000,000,000! Who *sold* all those bonds to millions of people? The answer is, nobody sold them.

80% of the employees of the National Tube Company ... 75% of the employees of Carnegie-Illinois Steel Company ... thousands of employees of other U.S. Steel subsidiaries ... more than 8 million employees of other companies bought U.S. Savings Bonds and are buying them month on the easy, automatic Payroll Savings Plan. employers merely offered these men and women an tunity to save for their future. There was no pressu emotional appeal.

How does employee participation in *your* Payrol ings Plan match up with the 80% of National Tub 75% of Carnegie-Illinois? Or, perhaps you are one relatively few large companies that do not have a In either case, wire or write, Savings Bond Division Treasury Department, Suite 700, Washington Bldg., ington, D.C. Your State Director is ready to help yo a package plan—application blanks, promotional ma practical suggestions and all the personal assistanc may desire.

The U. S. Government does not pay for this advertising. The Treasury Department thanks, for their patriotic donation, the G. M. Basford Company and

STEEL

ium . . . (*Continued from Page 58*)

d›p forgings, in the price range $10-$25 per d Deliveries have been made to fabricators, in- n Transue & Williams, Pratt & Whitney, Doug- ›craft, Curtiss Propeller, General Electric and ›;house. Mallory reports excellent results in n operations with titanium, the metal filling ›is "even better than steel". However, as with ›nelters, the bottleneck is the insufficient sup- ›f ponge metal.

›plications have been exclusively in military air- ›although Mallory has uncovered one important ›ity in the commercial field about which it is ›king as yet. Jet engine forgings such as com- ›sc disks, blades and rotors have been fabricated, ›with skin around high-temperature components, ›y of stainless steel. It is figured possible to ›0 pounds in the weight of a large jet engine ›r substituting titanium for stainless steel in ›lisks, and perhaps a 5-6 per cent saving in ›eight of a jet craft by including other appli- ›.

› aircraft laboratory of Wright-Patterson Air ›Base at Dayton, O., has two major research ›s under way on titanium structures for air- ›nd missiles (STEEL, Nov. 27, p. 60). One is ›sign of the complete wing for a supersonic mis- ›e other the design and fabrication of a com- ›ft fuselage section for a jet fighter, replac- › corrosion resistant alloy steel with titanium

›**technics in Flash Welding**—Casing rings for ›47 jet engine, of commercially pure titanium, ›been flash butt welded, sized and machined in ›tion quantities and on standard equipment by ›can Welding & Mfg. Co., Warren, O. The rings ›been produced in various sizes, for both com- ›n chamber and tail cone assemblies. One of the › sizes was 35 inches in diameter and of 1x1¼- ›ar stock. Formed to ring shape in rolls, the › were flash butt welded in a 750 kva welding ›ne, using a burnoff of about ¾-inch and an › of ¾-inch. Bursts of intense bluish-white ›ht, similar to those observed in welding of mag- ›n and aluminum, accompanied the welding op- ›n. Considerable latitude exists in settings of › nd current on the machine, a typical sequence › a 15-second cycle of burnoff and upset. Flash ›ily removed by an air jet played on the joint › it is still hot in the welding machine.

›gs were reheated to 1600° F before being sized ›panders, and it was found desirable to carry ›e heating as rapidly as possible. Machining ›andled at surface speeds and feeds far beyond › recommended in most published data. For ex- ›, with the use of carbide tools, speeds in excess ›) feet per minute with a feed of 0.012-inch per ›tion resulted in an excellent finish. This com- › with Titanium Metals' report to the effect ma- › opinion favored the use of high-speed tools, › feeds of 0.002-0.010-inch per revolution and ›s of 35-45 feet per minute.

›hining of the rings at American Welding re- quired the development of a narrow flange midway on either side, approximately 0.090-inch thick; this for subsequent welding to the formed sheet metal of the casing.

Experimental work on flash butt welding was done at American Welding early in 1949, using ½-inch round rods received from Remington Arms. Summary of the laboratory report issued at the time showed the weld zone in the as-welded condition to contain an acicular structure. Annealing at 1650-1700° F, with no protective atmosphere, changed the structure to fine dendritic shaped grains, while extended annealing at the same temperature caused grain growth. Photomicrographs on page 58 show some of the structures developed. One weld tested to breakdown had a tensile of 115,000 psi and the fracture occurred in the parent metal. All welds were proof loaded at 22,000 pounds, or 105,000 psi, with no failures.

P. R. Mallory has made extensive tests on spot welding of its alloys in sheet form. In spot welding 1/16-inch sheets, welds disclosed rupture strength of 4500 pounds, although there was a noticeable loss of ductility in the metal. Time, current and pressure were not found to be critical factors.

DuPont reports on primary forming operations, using commercially pure titanium (99.5 per cent Ti):

Forging

Based on experimental work carried out with laboratory equipment, but employing ingots of considerable variation in carbon, nitrogen and oxygen, the best temperature range for forging has been established at 1450-1850° F. As the amount of carbon, nitrogen, oxygen and other alloying elements is increased, higher temperatures are frequently needed. All heating of reasonably thick sections can be done in air. Oil, gas and electrically heated furnaces have been employed.

Hot Rolling

Forged billets which have been spot ground to remove gross surface defects can be hot rolled at temperatures from 1350-1500° F. Surface tempera-

TYPICAL COMPARATIVE STRENGTH/WEIGHT VALUES OF TITANIUM AND SOME ALLOYS

Property	Commercially Pure Titanium* Annealed Sheet	½ Hard	Full Hard	75ST	24ST	302 Stainless Steel
			400° F.			
0.2% Offset Yield / Density	214	500	460	394	208	122
Ultimate / Density	318	520	586	405	276	238
			800° F.			
0.2% Offset Yield / Density	146	257	312	...	...	119
Ultimate / Density	220	275	326	...	...	217
			1000° F.			
0.2% Offset Yield / Density	78	110	107	...	...	119
Ultimate / Density	100	140	122	...	...	196

* As produced by Remington Arms Co. Inc.

Note: All values in tables to be multiplied by 10^3. Density, Ti taken as 0.164 lb/cu in.; aluminum alloys as 0.101 lb/cu in.; stainless steel as 0.286 lb/cu in.

ture should not fall below 1100° F for induction melted ingots and 900° F for arc-melted ingots. Again, as alloying elements—carbon, nitrogen, oxygen, aluminum, chromium and iron—are incorporated, minimum temperatures may of necessity have to be increased.

Annealing

Sections up to 1 inch thickness are satisfactorily annealed at 1300° F in air for one hour. A stress relief anneal can be accomplished by heating at not over 570° F in air for one hour. Where anneals of thin sections, as in the case of foil, fine tubing or wire are required, vacuum annealing should be used.

Descaling

Best carried out in a conventional sodium hydride bath with a 20-30 minute treatment. This may be followed by a brightening dip for 10-15 seconds in a 2 per cent hydrofluoric, 10 per cent nitric acid mixture.

Cold Rolling

A good finish with a minimum of edge cracking can be obtained by conventional equipment and methods, although rolling becomes more difficult as alloying elements increase. Titanium produced by the iodide process can be cold reduced 98 per cent. Commercial pure metal can be cold reduced 30-50 per cent.

Welding

Preliminary experiments at General Electric, Linde Air Products and DuPont experimental engineering labs indicate titanium can be spot welded, seam welded and inert-arc welded to itself. Some weaknesses of the metal at the weld have been observed with sheet of high carbon content.

Machining

Preliminary tests show machining to be similar to that for austenitic stainless steel, with either high-speed or cemented carbide tipped tools in drilling, reaming, milling and turning operations. Slower speeds and heavier feeds than those used for 18-8 stainless steel are recommended. Lubricants are the same.

Sawing

Cold saws, power hack saws, abrasive cutoff wheels and powder cutting have been successfully employed on sections up to 6-inch diameter. Shapes up to 12-inch diameter have been separated with parting tools. It has been found that tool life and cutting speed are improved by maintaining a heavy feed; otherwise, the tool or blade has a tendency to "ride" on the work.

Bulk of titanium production thus far has been of the commercially pure type. Titanium Metals Corp. identifies this material as Ti-75A, having nominal composition of 0.10 per cent iron, 0.02 per cent nitrogen and a trace of oxygen. Physical properties as annealed are: Hardness 175 Vhn, ultimate strength 70,000-80,000 psi, yield 45,000-55,000 psi, elongation 20-30 per cent and reduction of area 45-70 per cent. It does not respond to heat treatment, but may be cold worked to well above 100,000 psi tensile. Many

AVERAGE ROOM TEMPERATURE PROPERTIES OF COMMERCIALLY PURE TITANIUM AND TITANIUM ALLOYS

Property	Commercially Pure Titanium RC-55[a]	Commercially Pure Titanium RC-70[b]	Titanium Base Alloys RC-130-A[c]	Titanium Base Alloys RC-130-B[d]
Ultimate tensile strength (psi)	75,000	90,000	150,000	145,000
Tensile yield strength (psi)	65,000	80,000	140,000	135,000
Proportional limit (psi)	50,000	52,000	105,000	105,000[f]
Modulus of elasticity (psi)	15.5x10[6]	15.5x10[6]	15.5x10[6]	15.5x10[6]
Elongation (%)	25	20	12–15	15–20
Bend radius (sheet)	1.5–2.0T	2.0–2.5T	1.5–3.0T	.....
Creep strength at 10[-4]%/hr (psi)	.....	55,000	110,000	115,000[f]
Fatigue endurance limit (psi)	.....	50,000	75,000	80,000[f]
Impact strength (ft-lbs) (bar)	.....	15[e]	.....	13

[a] RC-55 is Rem-Cru commercially pure titanium with a 55,000 psi minimum yield strength.
[b] RC-70 is Rem-Cru commercially pure titanium with a 70,000 psi minimum yield strength.
[c] RC-130-A is Rem-Cru titanium-base *sheet* alloy with a 130,000 psi minimum yield strength.
[d] RC-130-B is Rem-Cru titanium *bar and forging* alloy with a 130,000 psi minimum yield strength.
[e] Forged bar properties—all other values listed in this table are sheet properties.
[f] Estimated from limited data.

TENTATIVE PHYSICAL PROPERTIES OF TWO TITANIUM ALLOYS
Comparison With Other Structural Alloys
(Forgings)

Property	Mallory titanium alloy L-2749	Mallory titanium alloy L-2748	Steel, cold rolled SAE 1010	Steel, stainless type 302	Aluminum 24ST alloy
Ultimate tensile strength, psi	90,000	165,000	55,000	90,000	70,000
Yield strength (0.2% offset), psi	75,000	153,000	25,000	35,000	41,000
Elastic modulus (x10[6]), psi	16.3	18.0	30.0	29.0	10.0
Elongation (% in 2 inches)	18	10	20	50	15
Endurance limit—fatigue, psi	63,000	95,000	.....	.....	18,000
Coefficient (°C) of linear thermal expansion	10.4x10[-6]	9.0x10[-6]	13.5x10[-6]	18.0x10[-6]	23.2x10[-6]
Density—lbs/cu in.	0.16	0.16	0.28	0.29	0.10
Ultimate strength/density	562,000	1,030,000	196,000	310,000	700,000
Elastic modulus/density	102x10[6]	112x10[6]	107x10[6]	100x10[6]	100x10[6]
Electrical resistivity, microhm—cm.	60	140	10	73	6
Hardness, Rockwell "A"	62	71	44	50	45

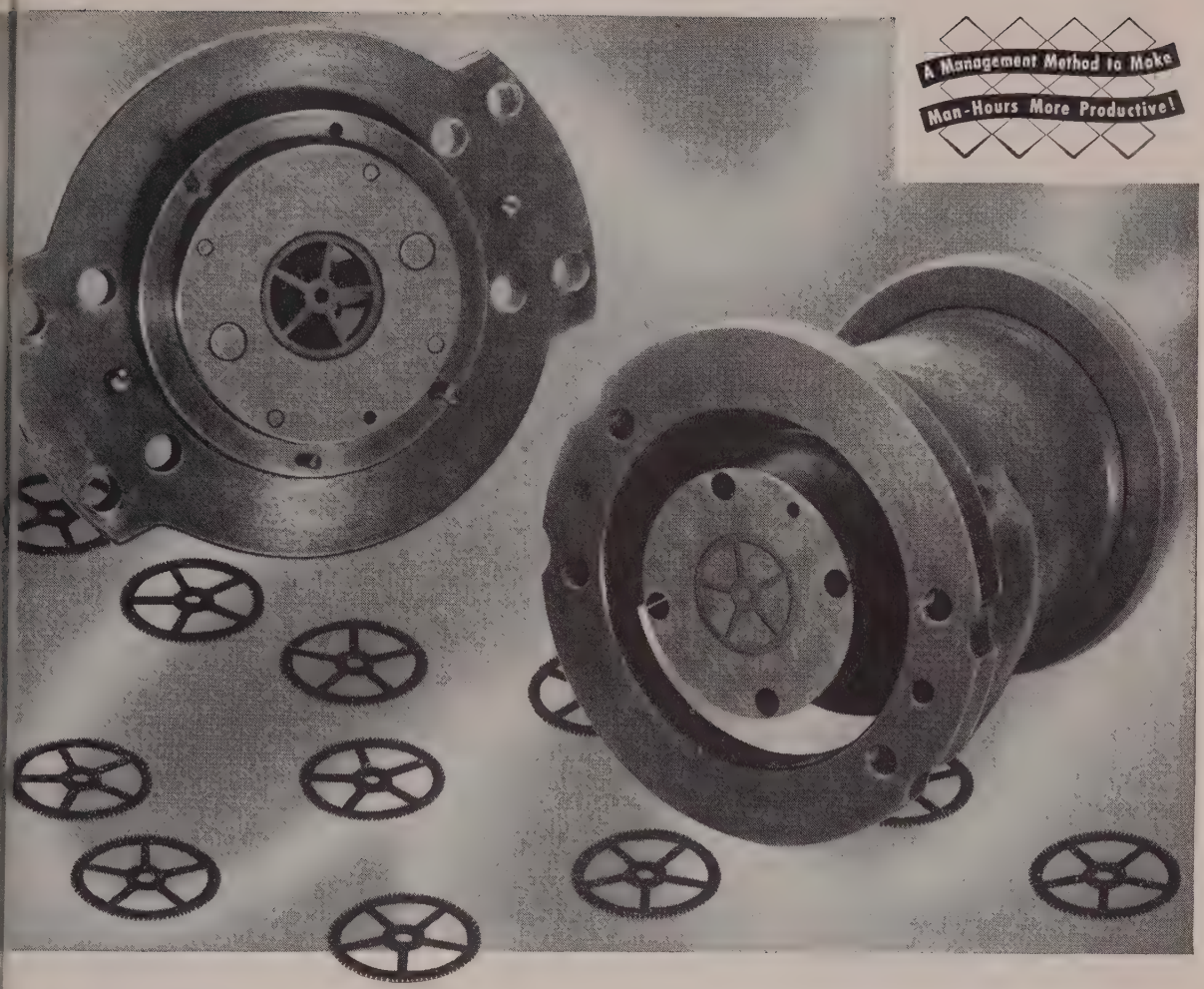
tons already have been sold, primarily as sheet, strip and wire. Base prices on sheet and strip are $15 per pound, on plate $12 a pound, on wire $10 a pound, on forgings $6 a pound. Numerous extras apply for size, cutting, quantity, finish and packing.

Titanium Metals at present markets four different titanium-base alloys, as follows:

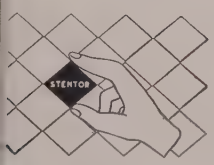
Type Ti-100A, an oxygen-nitrogen alloy used primarily for sheet, plate, strip and wire, not heat treatable but work hardenable. Iron content is below 0.1 per cent and carbon is 0.02 per cent maximum. As annealed at 1300° F it shows tensile of 100,000 psi, yield of 75,000 psi, elongation 20-25 per cent and reduction of area 45 per cent.

Type Ti-125A, an alloy primarily for sheet and strip, not heat treatable but work hardenable, with nominal composition of 1.8 per cent chromium, 0.9 iron, 0.15 oxygen, 0.02 carbon and 0.04 nitrogen. As annealed at 1300° F it shows tensile of 125,000 psi, yield of 80,000 psi, elongation of 18-20 per cent and reduction of area 45 per cent.

Type Ti-150A, alloy used primarily in bars and forgings, heat treatable and work hardenable, with nominal composition of 2.7 per cent chromium, 1.3 iron, 0.25 oxygen, 0.02 nitrogen and 0.02 carbon. Water quenching from 1700° F yields hardness of



Why Not Gear Up For Today's Production *This Way?*



For 11 years this entor blanking die and punch gave ouble-free performance, averaging)0,000 gears per grind. This record ıabled management and production to void production delays by keeping achines operating with fewer shut-)wns for resharpening. The precision ears, 120 teeth/90 pitch, are made from 4 ga., ¾-hard brass. In heat treatment ıe die moved only .0005" on the maxi- ıum diameter of the gear.

: wasn't a happy coincidence that the)ol and die steel was perfectly suited to ut production from the tools on a mooth, trouble-free basis. It was planned that way—with the help of the Carpenter Matched Set Method. For the Method not only enabled this plant to eliminate costly experimentation in selecting the right steel, but enabled management to forecast output in advance because they could count on the tools to produce the parts *on time.*

Used in hundreds of plants, the Method offers far more than simplified tool steel selection. It makes machine operators more productive. It enables your plant to carry lower tool steel inventories. It makes heat treating easier, simplifies tool-room and production procedures. What's more, it is amazingly easy to apply. No extra cost or bother. To discover what it can do for you, ask for the new booklet "How to Get Better Tool and Die Performance". THE CARPENTER STEEL CO., 139 W. Bern St., Reading, Pa.

Export Department: Woolworth Bldg., New York 7, N.Y.—"CARSTEELCO"

Carpenter

The Standard Tool Steels of Industry

MATCHED TOOL & DIE STEELS

More than top-grade steels . . . a Method to keep tooling and production on schedule!

For your convenience, Carpenter carries warehouse stocks in principal cities throughout the country.

over 500 Vhn. Heavy sections require quenching to produce maximum hardness while thin sections will air harden. As annealed it shows tensile of 150,000 psi, yield of 130,000 psi, elongation 12-20 per cent and reduction of area 40 per cent.

Type Ti-175A, alloy used primarily for bars and forgings, both heat treatable and work hardenable, with nominal composition of 3.0 per cent chromium, 1.5 iron, 0.5 oxygen, 0.04 nitrogen and 0.02 carbon. As annealed at 1300° F it shows tensile of 175,000 psi, yield of 160,000 psi, elongation 10 per cent and reduction of area 30 per cent.

An annoying problem in alloy production is the precise reproduction of analysis from heat to heat. As mentioned before, the sponge itself is subject to variations and the molten metal is all too prone to pick up minute fractions of unwanted elements which often alter physical properties to a marked degree.

Huge Press Forms Plane Parts

Applying 7000 tons to the forming of large bulkheads as well as many miscellaneous small parts for the newest of Air Force bombers is a rubber pad forming press being built by Hydraulic Press Mfg. Co., Mount Gilead, O. Said to be one of the largest machines of its type, the press utilizes the Guerin process, developed to eliminate blanking and forming bottlenecks in the aircraft industry.

In this process, the rubber pad acts as a pressing medium, forcing the metal againt the form or die blocks directly beneath the sheet metal. Reported advantage of the process is that many different parts can be made simultaneously, the number and size being dependent upon the pressing surface available.

Press carries a rubber pad measuring 48 x 120 inches and is fed by hydraulically-actuated loading tables. New die blocks and sheet metal can be positioned on the loading table for loading into the press in a continuous feeding operation.

Devises Hydraulic Ore Hoist

How ore, coal, and rock may be moved from underground to the surface in a continuous stream by the hydraulic hoist was disclosed by Percy S. Gardner, Jr., Bagdad Mining Co., Phillipsburg, Mont., at a session of the 1950 Metal Mining Convention and Exposition, Western Division, The American Mining Congress.

The hydraulic hoist consists of two pipes joined together at the bottom, a motor driven pump at the top of one column circulating water downward in that column and upward in the other column. A set of loading chambers is located at the bottom of the "upward" column for the purpose of introducing ore into that column, a displacement pump at the chambers to displace a volume of water from the upper to the lower chamber, equal to the volume of ore charged into the upper chamber. A pressure equalizing valve at the chambers equalizes pressure in the upper chamber with that in the lower chamber. A dewaterizer at the top of the upward column dewaters the ore and allows the water to return to the pump for recirculation. A flywheel mounted between the pump and motor keeps the system going in case of power failure so that the ore in the column and chambers will be removed before the water falls below lifting velocity.

Ore must be crushed to a size at least one-third the pipe diameter. Velocity required to lift ore will be the same for all sizes of pipe. Capacity will vary with pipe size. Power determination is based on experiments which are found to be valid for a large model. Loading cycle is 30 seconds to 1 minute. No classification will occur in the pipe at hoisting velocities and no bridging or hangups will take place in the charging valves. No difficulty, it was reported, will be experienced with occasional large pieces if they are smaller than the pipe diameter. Foreign material, such as tramp iron, will pass the pipe readily.

Ore load in the column does not increase static pressure, Mr. Gardner stated. When the system is put into an inclined shaft power requirements are about double, and wear on the pipe increases. Loading chambers may be installed at different levels. A depth of 5000 feet, with static pressure of 2150 psi, seems feasible within the limits of modern design.

Hobber Cuts Elliptical Gears

Through use of elliptical gears a constantly varying output is obtained from a constant input. Both speed and power will vary depending upon the eccentricity of the gears. They can also be designed to produce a desired quick-return ratio.

This type of gear, with its own peculiar type of use noted above, now can be cut with a special form hob on a standard machine with a standard setup. A development of Barber-Colman Co., Rockford, Ill., the hob has a number of leads equal to one-half the number of teeth in the gear, each lead cutting two diametrically opposite teeth. Since the teeth are designed from a base ellipse rather than a base circle, even the involute curves on the opposite sides of the same tooth are not similar. Thus, each thread on the hob differs from each other thread.

Hob is topping so that gears can be cut from bar stock, eliminating necessity of locating the hob with respect to the work. The true involute teeth designed from a base ellipse produce the best possible rolling action.

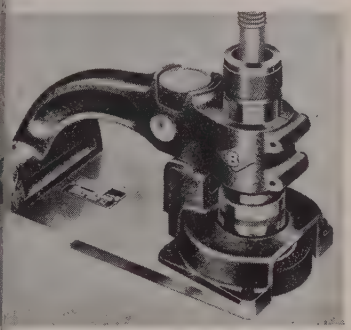
Blades Bear Standard Numbers

Adoption of standard stock numbers for power-type hack saw blades is being announced by Hack Saw Manufacturers Association of America. Prior to manufacturers' approval of the code, it was submitted to National Supply and Machinery Distributors' Association and Southern Supply and Machinery Distributors' Association, receiving the endorsement of both.

The industry standard stock numbers code will be included in printed matter or otherwise used by an individual hack saw blade manufacturer as when desired by him. It will not conflict with any previously used code, the association states.

rable Metal Surfacer

lid Brothers Co. Inc., Beverly, ., is offering a portable precision cer performing work equivalent nd scraping with a reduction in involved. Usable by semiskilled , it turns out dead-flat surfaces standard 3-inch cup wheels ing at 6000 rpm. An angular l setting gives varying cut for ving high spots or fine finish-



and is adjustable from 0 to 2 de-s. Fine adjustment of cutting h is provided by a micrometer luated depth stop.

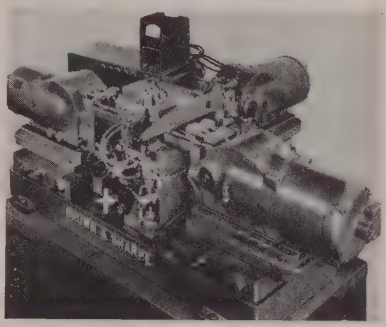
ermanent and true hardwearing ace is on the sole plate of the acer. Operation is from a motor ch may be mounted overhead, the es being through a flexible shaft. ndle is totally enclosed and fitted h precision ball thrust races. rkface of sole plate is grooved to uce friction. Workhead is bal-ed and spring loaded so that ding wheel is clear of work when tool is not in operation.

k No. 1 on Reply Card for more Details

eeds Accurate Machining

rown & Sharpe Mfg. Co., Provi-ce 1, R. I., is offering a machine positioning jet engine blades and ling center holes used for loca-l purposes in subsequent opera-ns. Blade is supported in a non-tional mounted cradle arranged to ustably pivot about two axes and adjustable vertically. Either of three movements can be clamped ependently without affecting the ers. Proper positioning is effect-by observation of six strain gage icator points in contact with the face.

ndication is obtained from a wn & Sharpe electronic amplifier. ltiple position switch permits se-ion of individual gage identifica-n setup purposes. Additional switch positions cause all gages to be interconnected electrically to show individual average indication for the three movements required to bring

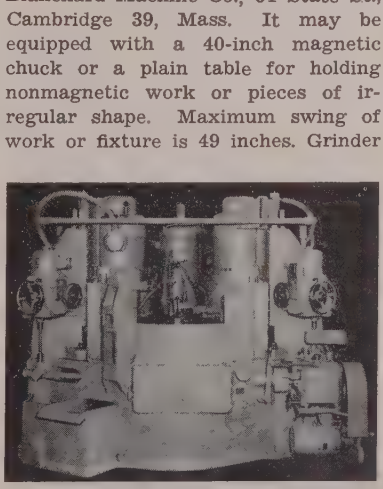


the surface into its proper position. After positioning the blade the switch is operated causing advance of three combination center drill and facing cutters which make three operations on bosses on the blade. Set-up is from a master blade. Machine accommodates 17 sizes of blades and operates at the rate of 100 per hour.

Check No. 2 on Reply Card for more Details

Rotary Table Surface Grinder

Multispindle in design is the No. 16A3 vertical spindle rotary table surface grinder manufactured by Blanchard Machine Co., 64 State St., Cambridge 39, Mass. It may be equipped with a 40-inch magnetic chuck or a plain table for holding nonmagnetic work or pieces of irregular shape. Maximum swing of work or fixture is 49 inches. Grinder



is equipped with three abrasive wheels, all of which can be set to grind the same surfaces when stock removal is heavy or accurate tolerances for dimension or surface finish are required.

One spindle may be set to grind a surface at the same or different height, at a different distance from center of chuck. Photograph shows a grinder equipped with two spindles driven by 30 hp motors and one driven by a 15 hp motor. It is equipped with a 24-station fixture arranged for automatic clamping and releasing. All grinding wheels are under the control or an automatic caliper or sizing device which will hold dimensional variation within a total range of 0.001-inch.

Check No. 3 on Reply Card for more Details

Small Parts Plating Unit

Cutting tools and wear parts may have their life multiplied several times through application of an industrial hard chromium plating process using a model A-20 Chromaster plating unit and Chromasol liquid plating solution, both developments of Industrial Chrome Division, Ward Electric Co., Mount Vernon, N. Y. Plating unit provides facilities for hard chrome plating metal surfaces

up to 10 square inches at the recommended current density of 2 amperes per square inch. Unit is compact and portable. Greater capacities will be available at a later date.

Power is furnished by a dry disk selenium rectifier this being part of a complete unit which includes plating bath tank, rheostat timer, ammeter and reversing switch for stripping action. Plating solution is of a noncritical type and is shipped in concentrated form. It delivers a hard chrome plate that follows the exact characteristics of the base metal to which it is applied. Rate of deposition remains constant at 0.002-inch per hour.

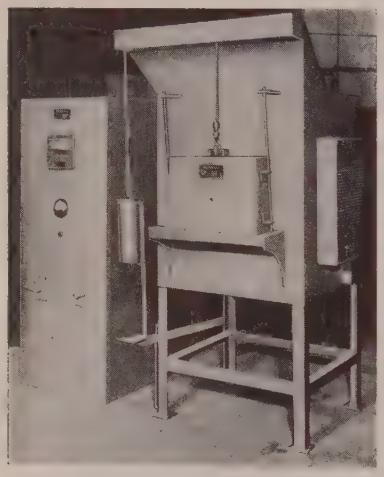
Check No. 4 on Reply Card for more Details

General Purpose Furnaces

Designed for heavy and continuous duty at all heat levels up to 2500° F, with higher temperatures available for short or intermittent runs, is the FG series of electric furnaces with various load capacities offered by Pereny Equipment Co., 893 Chambers Rd., Columbus 12, O.

Each of the furnaces has a separate matching control panel unit with indicating controller, transformer, current input meter with pushbutton reading and magnetic contactor. Choice of standard makes or types of controls (recording, program or cycle, excess temperature, etc.) are also available.

Voltage regulating type transformer with 36 taps on multiple deadfront switches maintains constant heating rate. Maximum connected



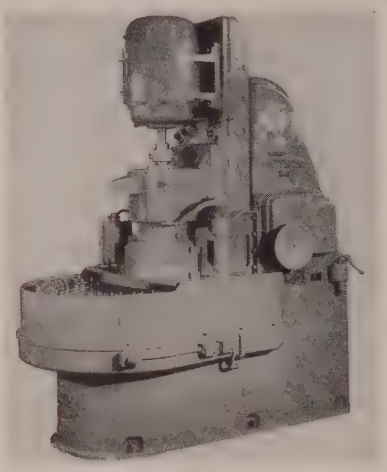
loads of furnaces range from 9 to 50 kw. Loading areas of the several models range from 4 x 8 x 10 to 12 x 16 x 30 inches. Within the work chamber the entire surface of the U-shaped carbide hearth is evenly exposed to the heat.

Check No. 5 on Reply Card for more Details

Close Tolerance Grinders

Mattison Machine Works, Rockford, Ill., is producing the Hanchett type No. 36 grinder, capable of handling a wide variety of work and producing close tolerances on jobs requiring precision finishes. The automatic rotary machines are built in four types. No. 36A is used on work requiring large production and accurate finish where the stock removal is such that it can be taken at one pass under the grinding wheel. Parts are placed directly on a rotary magnetic chuck or work table carrying a group of workholding fixtures. Vertical slide on which the wheel head is mounted has one flat and one V-way, held in alignment by adjustable tapered gibs.

No. 24A is a smaller edition of the No. 36A with the same design and construction features. No. 36-A2 is for use where stock removal is excessive and a high production on a large amount of work is needed, while maintaining close tolerances and accurate finishes. It resembles two No. 36A machines joined together. The additional grinding spindle enables a work base to be completely processed in one pass through the machine. A job can re-



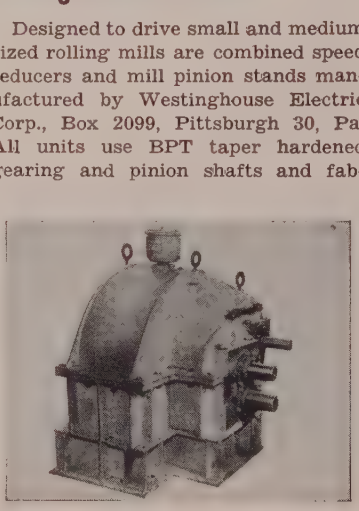
ceive a rough cut on the first spindle, be checked by an automatic sizer, pass under the second spindle for a finished cut and again be checked by an automatic sizer before release.

No. 24-A2 is of the same design as the No. 36-A2, but built on a smaller scale.

Check No. 6 on Reply Card for more Details

Rolling Mill Gear Units

Designed to drive small and medium sized rolling mills are combined speed reducers and mill pinion stands manufactured by Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa. All units use BPT taper hardened gearing and pinion shafts and fab-



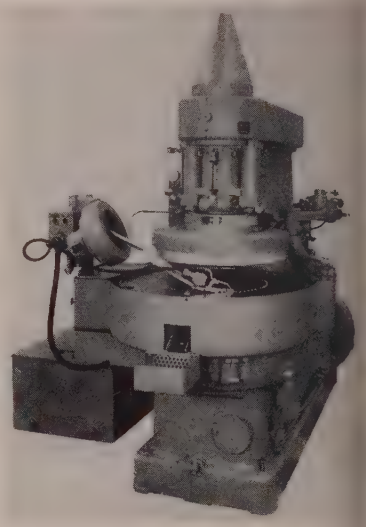
ricated steel housings. These features permit mounting in minimum space.

Gearing is of standard AGMA hobbed helical type with a high helix angle for smooth operations and less vibration at higher speeds, as well as assuring uniform tooth loading and wear. Antifriction bearings are used throughout, with lubrication by a splash or forced feed system as required. Four sizes are available for powering by 25, 50, 100 and 150 hp motors.

Check No. 7 on Reply Card for more Details

Vertical Lapping Machine

Continuously finishing small flat parts and incorporating automatic loading and unloading is the No. 26 Hydrolap vertical lapping machine built by Norton Co., Worcester 6, Mass. Advantages resulting from its



use include no down time except for dressing laps, high production with no sacrifice in accuracy or finish, reduced handling time, unskilled machine operator, a simple work holder which allows for economical replacement when required and an automatic safety device which stops machine if work is improperly loaded.

In upper left of machine illustrated is the hopper containing unfinished parts which rotates and picks them up in slots, machined to allow parts to seat with the raised surface down. Selected washers feed by gravity down the loading chute to the finger loading mechanism. They are directed between rotating abrasive laps in a path which leads from the outer edge of the laps to the inner edge and out again, reducing lap dressing operations to a minimum.

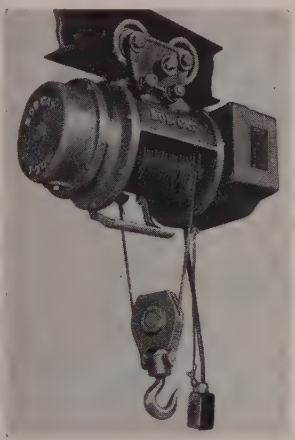
Check No. 8 on Reply Card for more Details

Heavy Duty Electric Hoists

Made in ½, 1, 1½, 2, 3, and 5-ton capacities are Bob-Cat heavy duty electric cable hoists, offered by Cleveland Chain & Mfg. Co., Broadway and Henry Streets, Cleveland 5 O. Motor is totally enclosed within

cable drum, reducing over-all di- sions and affording weight sav- They are completely protect- against moisture, splashing ds, weather, dust and corrosive ospheres.

oists are powered by high torque ors and gear reduction is by ns of a double internal gear train rporating two Weston-type load tes. Safety factor is in excess to 1. Load hook oscillates on

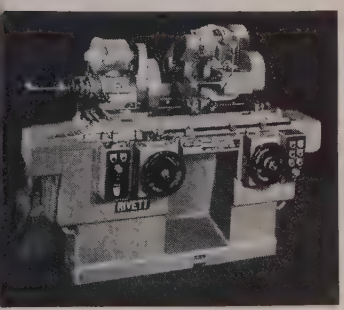


bearings and swivels on roller rings. It is suspended on a 5/16- n preformed plow steel cable. Op- tion may be on 220, 380, 440, or -v 3-phase, 60-cycle current with ner pendant rope or pushbutton trol on pendant cable.

Check No. 9 on Reply Card for more Details

inder Eliminates Setup

Designed to eliminate dual work ups for internal and external nding is the model 1024 hydraulic nder offered by Rivett Lathe & nder Inc., Boston 55, Mass. Wheel-



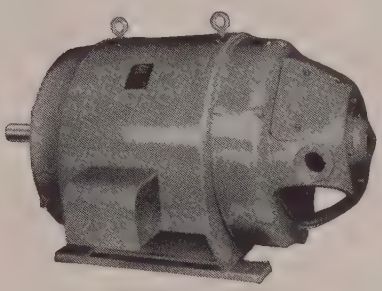
ad swivels 180 degrees and mounts ternal and external spindles. It is ilt to perform all types of grind- , including small, large and deep- le internal grinding and straight d long shaft, diameter and should- external grinding.

Internal spindle speeds are from 6000 to 35,000 rpm. All spindles are flange mounted, sealed from grit and life lubricated. External spindle has several roll roller bearings for radial load and ball bearings for end thrust. Other features include micrometer table stop and fine feed for shoulder and blind-hole grinding, sine bar for setting workhead on table swivel and all grinding wheel feed controls at operator's right hand.

Check No. 10 on Reply Card for more Details

Variable Speed Motors

Electric Machinery Mfg. Co., Minneapolis 13, Minn., has developed a line of heavy duty wound rotor induction motors for applications requiring variable speed drives, high starting torque and low starting current or long acceleration periods. They are built in ratings from 30 to 1500 hp and are of drip-proof construction. Splash-proof or enclosed forced-ventilation models are also available. Fabricated steel frame



features high physical impact strength and crack-proof steel bar feet.

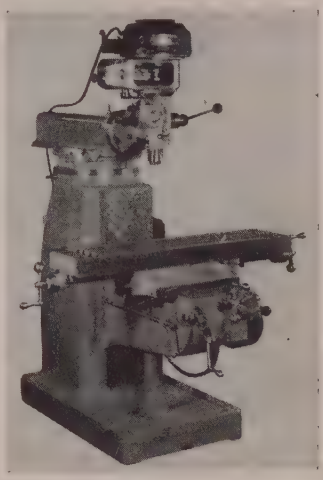
Motors are available with either ball or split-sleeve type bearings and are easily accessible for inspection and maintenance. Brush pressure is easily adjusted with a ratchet wheel brush tension adjuster providing metered increase or decrease of pressure on individual brushes.

Check No. 11 on Reply Card for more Details

Miller Features Versatility

Movement of the vertical head up to and including 45 degrees across the table each way from a vertical position is incorporated in the model 2 UV universal vertical milling machine built by Tree Tool & Die Works, Racine, Wis. It is capable of angle milling, drilling and boring. Vertical head movement permits angle milling cuts the length of the longitudinal table feed without resetting. Head can also be rotated in a plane parallel with the table axis 90 degrees each way.

A 1 hp axial air-gap motor powers the spindle at speeds from 140 to 3500 rpm or from 210 to 5200 rpm. Head capacity is from ⅛ to 1½-inch end mills. It is mounted on a dovetail type ram enabling moving the spindle to any position perpendicular to the table without realigning after moving. Automatic collet closing mechanism is incorporated. Feeds of



¾, 1⅜, 2⅜, 4 and 7 inches per minute and the rapid traverse of 70 inches per minute are incorporated in the table movement.

Check No. 12 on Reply Card for more Details

Sweeper Drives Like Car

Capable of sweeping up to 43,500 sq ft per hour at speeds up to 8 mph is the model 24 power sweeper designed by G. H. Tennant Co., 2530 N. Second St., Minneapolis 11, Minn. Driven like an automobile, it has a 4.4 hp air-cooled gasoline engine, automatic clutch and reverse gear. Because it is only 29 inches wide, it will clean narrow aisles. A two-speed transmission allows a speed as low as 2 mph in congested areas. Vacuum system of the unit draws flying dust from cracks and crevices and deposits it in a fabric bag. A 24-inch brush moves soilage into an easy-to-dump hopper.

Check No. 13 on Reply Card for more Details

Drill Press—Contour Grinder

Mounting on any drill press column is a contour grinder attachment built by George F. Grant Co. Inc., 24 Kempton Place, West Newton, Mass. Swinging out of the way when not in use, the contour grinder uses a standard 2½ x 60-inch belt. Concave or convex parts and radii may be ground, and deburring and shaping performed.

Change of belt ratio or spindle

speed provides speed ranges from 7000 to 36,000 rpm (700 to 4500 feet of abrasive per minute). A special interchangeable spindle attachment provides continuous reel form or cylindrical grinding. Felt wheel blanks may be shaped to meet varying requirements. Special equipment includes a spindle grinding attachment using ⅜ to 2-inch diameter abrasive sleeves for internal surfaces.

Check No. 14 on Reply Card for more Details

• • •

MAKES SPRINGS: A new model hand-operated spring coiling machine for making compression, extension and torsion springs is available from the Carlson Co., New York 7, N. Y. About 300 precision springs exactly alike can be wound per hour. Springs can be made with outside diameters up to ⅞-inch with overall lengths up to 4 inches using wire diameters from 0.005-inch to 0.065-inch.

Check No. 15 on Reply Card for more Details

FOR PRODUCTION WELDING: Designed for heavy duty, round-the-clock production welding is the new 80 series of industrial alternating current arc welders, announced by Marquette Mfg. Co., Minneapolis, Minn. One feature is the use of Hipersil steel transformer cores which are claimed to provide one-third greater flux-carrying capacity, reducing power consumption and operating costs. Welders are available in 200, 300 and 400 amp capacities.

Check No. 16 on Reply Card for more Details

SAFETY FOR OPERATOR: A new, improved, streamlined vertical mill attachment is introduced by Marvin Machine Products Inc., Detroit 26, Mich. Safety for the operator is provided by a protecting hood over the power transmission parts.

Check No. 17 on Reply Card for more Details

PRESSURE REDUCING VALVE: Hydreco VA series, a new type of plunger operated pressure reducing valve, is introduced by Hydraulic Equipment Co., Cleveland 17, O. Valve is designed for reducing line pressure in oil-hydraulic control systems so that individual hydraulic units may be operated with reduced pressure without changing normal system pressure.

Check No. 18 on Reply Card for more Details

UTILITY GRINDER: Lima Electric Motor Co., Lima, O., announces a new 6-inch model A deluxe utility grinder. It features dynamically balanced rotors, integrally cast wheel guards, adjustable tool rests and fast grinding, long wearing abrasive wheels. It has a ¼-hp, 3450 rpm motor of dust proof construction, single phase, ac, 60 cycle, 115 or 230 v (single voltage only). It is also available for 2 or 3 phase, ac, 60 cycle, 220 or 440 v.

Check No. 19 on Reply Card for more Details

CONTROLS HUMIDITY: Powered with a ½-hp hermetically sealed Freon condensing unit, the new dehumidifier 50, offered by Walter Haertel Co., Minneapolis, Minn., has a maximum 24-hour capacity of 50 pounds of water removal from the air.

Check No. 20 on Reply Card for more Details

FOR CORROSION PROOFING: Prufcoat Laboratories Inc., Cambridge, Mass., offer metal reactive primer P-10, a metal treating formulation that provides a two-step system for corrosion proofing old or moist metal surfaces. It does not require complete surface cleaning and works well on damp or dry surfaces. The coating can be applied by brush or spray.

Check No. 21 on Reply Card for more Details

GOGGLE PLATE VALVE: Edgar E. Brosius Co. Inc., Pittsburgh, Pa., announces the new Westling goggle plate valve, which allows fast positive mechanical operation with new protection against leakage. This cut-off valve can be opened and closed by one man in from ½ to 3 minutes depending upon size. It can be operated manually or can be motor driven and interlocked.

Check No. 22 on Reply Card for more Details

BALL-BEARING CENTER: No. 1490 ball bearing center, made by Delta Power Tool Division, Milwaukee 1, Wis., has a double row of sealed, lubricated-for-life ball bearings to take heavy radial and thrust loads. It is designed for use on lathes, grinders, screw machines, gear hoppers, etc.

Check No. 23 on Reply Card for more Details

TO MEASURE UP: No. 530 series of precision case-type steel tapes is announced by L. S. Starrett Co., Athol, Mass. Tapes are ⅜-inch wide and accurately etched with bright steel graduations on a no-glare black background. They are available in 25, 50, 75 and 100-foot lengths.

Check No. 24 on Reply Card for more Details

STAINLESS STEEL BELLOWS: Hydraulically formed stainless steel bellows in a wide range of sizes from 7/16 to 26⅜-inch diameter are available from Clifford Mfg. Co., Waltham, Mass. They are recommended for applications involving control of temperature and pressure, shaft sealing, steam traps, providing flexible joints for instruments which combine rotary motion and hermetic seal and transmission of movement hydraulically to remote parts.

Check No. 25 on Reply Card for more Details

BOLT CUTTER: With a capacity equal to that of a standard 18-inch cutter, a new 15-inch bolt cutter is introduced by Manco Mfg. Co., Bradley, Ill. The formed steel handles will not yield under pressure. Jaws are easily replaceable and resharpened when required.

Check No. 26 on Reply Card for more Details

PROTECTIVE COATINGS: Two new synthetic rubber coatings are available from Carboline Co., St. Louis 5, Mo. Chlorclad M-4 is for use on metal and concrete for long life under corrosive conditions. W-6 is for use on wood subjected to continual immersion in water or for very moist conditions. Both adhere to all surfaces and old paints without the use of a primer or meticulous surface preparation.

Check No. 27 on Reply Card for more Details

FLOATING ANCHOR NUT: Plate-Lok floating anchor nut, made by Boots Aircraft Nut Corp., Stamford, Conn., incorporates the Plate-Lok nut in light compact, floating anchor base. Bases are steel, stainless steel, or aluminum alloy and are available in a variety of styles to suit method of attachment that is to be made.

Check No. 28 on Reply Card for more Details

T-SLOT CUTTERS: Reltool Corp., Milwaukee 46, Wis., offers T-slot cutters with straight shanks for use in the company's and other standard holders. Greater side chip clearance that results in free cutting action and less breakage is a feature of the cutters.

Check No. 29 on Reply Card for more Details

FOR MORE INFORMATION
on the new products and equipment in this section, fill in a card. It will receive prompt attention.

The Market Outlook

MANUFACTURERS of civilian goods are beginning to cut back operations under impact of steel and nonferrous metal shortages. Some metalworking shops already have curtailed. Others plan to do so shortly as the shift to a defense economy accelerates. But cutbacks to date provide only a foretaste of things to come. Much sharper contraction in hard goods manufacturing looms in the weeks ahead as government curbs on end uses of metal go into effect. Plant shutdowns and accompanying unemployment appear certain before end of the current quarter.

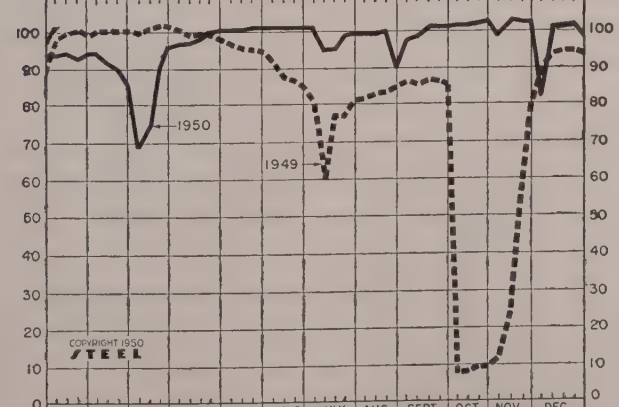
DEFENSE BUYING— Extent of slackening in general metalworking will depend largely, but not entirely, on the speed with which defense orders are placed. It will take manufacturers time to adjust to new production routines even after they obtain defense orders. In the main, however, it is believed dislocations will be short-lived. More than $3 billion worth of vehicles and spare parts have been ordered by the Ordnance Corps alone since last July, items ranging from medium tanks to radiator caps. Nearly one-third of this business went to small manufacturers. In addition hundreds of subcontractors are participating in the work. With the government program of controls and scheduling for the emergency being rounded into shape it is believed defense work will relatively quickly take up the slack in industry once the armament programs get into full swing.

SUPPLY— Progressively tight steel supply conditions are indicated through the first half of the new year. But chief immediate concern of general manufacturing industry centers on the nonferrous metals. Heavy general use, allocations to defense, and government stockpiling are playing havoc with supplies of these metals. The outlook in copper is particularly distressing at the moment. Effective Mar. 1 use of the red metal is banned in 300 civilian products.

PRODUCTS— Far extended delivery promises on fabricated steel are discouraging builders from going ahead with plans for various projects. Building steel is in growing scarcity, and more heavy steel items are scheduled to be diverted from commercial channels for the building of defense plants, including steel expansions. It is estimated the U. S. Steel Corp.'s project at Morrisville, Pa., alone will require 125,000 tons of structurals and 8000 tons of steel piling, not to mention huge tonnages of reinforcing steel, pipe and miscellaneous products. Fabricators are experiencing further cuts in their allocations of plates and shapes. Some plate producers will have less tonnage available for the general trade in March than they had in February despite the fact more plates will be coming from continuous sheet mills by that time. Non-rated consumers of sheets and strip are reconciled to further cuts in their allotments for March.

PRICES— Clarification of the status of steel prices under the government's rollback order is still awaited. Scrap price discussions were held in Washington last week, but no final decisions were reached. Reports in the trade were to the effect a rollback of No. 1 heavy melting steel to $45 Pittsburgh is possible, with unprepared scrap taking a $6 per ton differential under the major grades. Some trade authorities think it will be another 30 days at least before the price issue is settled. Meanwhile, prices are steady at recently established levels. STEEL's weighted index on finished steel holds at 167.89 as does the arithmetical composite at $103.50, and steelmaking scrap at $45.50. The pig iron composites also are unchanged with No. 2 foundry, $52.54, basic, $52.16, and malleable, $53.27.

NATIONAL STEELWORKS OPERATIONS



DISTRICT INGOT RATES

Percentage of Capacity Engaged at Leading Production Points

	Week Ended Jan. 6	Change	Same Week 1950	Same Week 1949
Pittsburgh	97.5	— 0.5*	97	96
Chicago	101.5	+ 1.5*	97.5	99
Eastern Pa.	100	+ 9	86	95
Youngstown	106	0	102	105
Wheeling	96	— 1	101.5	90
Cleveland	101	+ 6.5*	98.5	94.5
Buffalo	104	0	103.5	104
Birmingham	100	0	100	100
New England	83	— 6	80	85
Cincinnati	97	+ 9	106	99
St. Louis	87.5	+ 6*	89	84.5
Detroit	106	+ 2.5*	109	99
Western	92.5	— 3.5*	83	..
Estimated national rate	101	+ 3	93.5	97.5

Based on weekly steelmaking capacity of 1,928,721 net tons for 1951 and second half, 1950; 1,906,268 tons for first half, 1950; 1,843,516 tons for 1949; 1,802,476 tons for 1948.

* Change from revised rate.

Composite Market Averages

	Jan. 4 1951	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
FINISHED STEEL INDEX, Weighted:					
Index (1935-39 av.=100)..	167.89	167.89*	167.76	156.13	101.87
Index in cents per lb.	4.548	4.548*	4.545	4.230	2.760
ARITHMETICAL PRICE COMPOSITES:					
Finished Steel, NT.....	$103.50	$103.50	$100.53	$92.72	$58.27
No. 2 Fdry, Pig Iron, GT..	52.54	52.54	52.54	46.10	25.42
Basic Pig Iron, GT	52.16	52.16	52.04	45.60	24.75
Malleable Pig Iron, GT....	53.27	53.27	53.27	47.27	26.04
Steelmaking Scrap, GT ...	45.50	45.50	45.50	26.83	19.17

Weighted finished steel index based on average shipments and Pittsburgh district prices of the following 14 representative products during 5-year base period 1935-39. Structural shapes, plates, rails, hot-rolled and cold-finished bars, pipe, wire, nails, tin plate, hot and cold-rolled sheets, galvanized sheets, hot and cold-rolled strip. For complete explanation see STEEL, Sept. 19, 1949, p. 54

Arithmetical steel price composite based on same products as the weighted finished steel index with the exception of rails, cold-finished bars, galvanized sheets and hot-rolled strip.

Basic and No. 2 foundry pig iron composites are based on average prices at Pittsburgh, Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Granite City, Youngstown, Malleable composite based on same points, except Birmingham.

Steelmaking scrap composite based on average prices of No. 1 heavy melting steel at Pittsburgh, Chicago and Philadelphia.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED MATERIALS

	Jan. 4 1951	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh....	3.70	3.70	3.70	3.45	2.25
Bars, H.R., Chicago.....	3.70	3.70	3.70	3.45	2.25
Bars, H.R., del. Philadelphia	4.18	4.18	4.18	3.93	2.57
Bars, C.F., Pittsburgh	4.55	4.55	4.55	4.10–15	2.75
Shapes, Std., Pittsburgh ..	3.65	3.65	3.65	3.40	2.10
Shapes, Std., Chicago	3.65	3.65	3.65	3.40	2.10
Shapes, del. Philadelphia..	3.90	3.90	3.90	3.46	2.215
Plates, Pittsburgh	3.70	3.70	3.70	3.50	2.25
Plates, Chicago	3.70	3.70	3.70	3.50	2.25
Plates, Coatesville, Pa. ...	4.15	4.15	4.15	3.60	2.25
Plates, Sparrows Point, Md.	3.70	3.70	3.70	3.50	2.25
Plates, Claymont, Del.	4.15	4.15	4.15	3.60	2.25
Sheets, H.R., Pittsburgh...	3.60–75	3.60–75	3.60–75	3.35	2.20
Sheets, H.R., Chicago	3.60	3.60	3.60	3.35	2.20
Sheets, C.R., Pittsburgh...	4.35	4.35	4.35	4.10	3.05
Sheets, C.R., Chicago	4.35	4.35	4.35	4.00	3.05
Sheets, C.R., Detroit	4.55	4.55	4.30	4.20	3.15
Sheets, Galv., Pittsburgh..	4.80	4.80	4.80	4.40	3.70
Strip, H.R., Pittsburgh...3.75–4.00		3.75–4.00	3.75–4.00	3.25	2.10
Strip, H.R., Chicago	3.50	3.50	3.50	3.25	2.10
Strip, C.R., Pittsburgh ...4.65–5.35		4.65–5.35	4.65–5.25	4.15	2.80
Strip, C.R., Chicago.....4.50–90		4.50-90	4.30–90	4.00–15	2.90
Strip, C.R., Detroit 4.35–5.60		4.35–5.60	4.35 5.60	4.20–40	2.90
Wire, Basic, Pittsburgh ..4.85–5.10		4.85–5.10	4.85–5.10	4.50	2.75
Nails, Wire, Pittsburgh...5.90–6.20		5.90–6.20	5.90–6.20	5.30	2.90
Tin plate, box, Pittsburgh.	$8.70	$7.50	$7.50	$7.50	$5.00

SEMIFINISHED

Billets, forging, Pitts. (NT)	$66.00	$66.00	$66.00	$63.00	$42.00
Wire rods, 7/32–⅜", Pitts....	4.10–30	4.10–30	4.10–30	3.85	2.15

PIG IRON, Gross Ton

Bessemer, Pitts.	$53.00	$53.00	$53.00	$47.00	$26.25
Basic, Valley	52.00	52.00	52.00	46.00	25.25
Basic, del. Phila.	56.39	56.39	56.39	49.44	27.09
No. 2 Fdry, Pitts.	52.50	52.50	52.50	46.50	25.75
No. 2 Fdry, Chicago	52.50	52.50	52.50	46.50	25.75
No. 2 Fdry, Valley	52.50	52.50	52.50	46.50	25.75
No. 2 Fdry, Del. Phila. ...	56.89	56.89	56.89	49.94	27.59
No. 2 Fdry, Birm.	48.88	48.88	48.88	39.38	22.13
No. 2 Fdry (Birm.) del. Cin.	55.58	55.58	55.58	46.08	25.81
Malleable Valley	52.50	52.50	52.50	46.50	25.75
Malleable, Chicago	52.50	52.50	52.50	46.50	25.75
Charcoal, Lyles, Tenn.	66.00	66.00	66.00	60.00	33.00
Ferromanganese, Etna, Pa.	188.00	188.00	188.00	175.00	140.00*

* Delivered, Pittsburgh.

SCRAP, Gross Ton

No. 1 Heavy Melt. Pitts...	$46.50	$46.50	$46.50	$30.00	$20.00
No. 1 Heavy Melt. E. Pa..	45.00	45.00	45.00	23.50	18.75
No. 1 Heavy Melt. Chicago	45.00	45.00	45.00	27.00	18.75
No. 1 Heavy Melt. Valley..	46.25	46.25	46.25	30.25	20.00
No. 1 Heavy Melt. Cleve..	45.75	45.75	45.75	27.25	19.50
No. 1 Heavy Melt. Buffalo.	44.88	44.88	41.50	27.75	19.25
Rails, Rerolling, Chicago..	67.00	67.00	65.50	39.50	22.25
No. 1 Cast, Chicago	63.00	63.00	62.00	38.50	20.00

COKE, Net Ton

Beehive, Furn., Connlsvl...	$14.75	$14.75	$14.25	$13.25	$7.50
Beehive, Fdry., Connlsvl...	17.50	17.50	16.50	15.50	8.25
Oven Fdry., Chicago	21.00	21.00	21.00	20.00	13.00

NONFERROUS METALS

Copper, del. Conn.	24.50	24.50	24.50	18.50	12.00
Zinc, E. St. Louis	17.50	17.50	17.50	9.75–10.00	8.25
Lead, St. Louis	16.80	16.80	16.80	11.80	6.35
Tin, New York.....	157.00	151.00	140.00	77.50	52.00
Aluminum, del.	19.00	19.00	19.00	17.00	15.00
Antimony, Laredo, Tex. ..	32.00	32.00	32.00	32.00	14.50
Nickel, refinery, duty paid.	50.50	50.50	48.00	40.00	35.00

Pig Iron

For key to producing companies, turn next page.
Minimum delivered prices do not include 3% federal tax.

PIG IRON Gross Ton

	Basic	No. 2 Foundry	Malleable	Bessemer
Bethlehem,Pa. B2	$54.00	$54.50	$55.00	$55.50
Brooklyn,N.Y.,del.	....	58.79	59.29	....
Newark,del.	56.63	57.13	57.63	58.13
Philadelphia,del.	56.39	56.89	57.39	57.89
Birmingham District				
AlabamaCity,Ala. R2	48.38	48.88	....	....
Birmingham R2	48.38	48.88	....	....
Birmingham S9	48.38	48.88	....	....
Woodward,Ala. W15	48.38	48.88	....	....
Cincinnati,del.	....	55.58	....	....
Buffalo District				
Buffalo R2	52.00	52.50	53.00	....
Buffalo H1	52.00	52.50	53.00	....
Tonawanda,N.Y., W12	52.00	52.50	53.00	....
No.Tonawanda,N.Y., T9	....	52.50	53.00	....
Boston,del.	61.26	61.76	62.20	....
Rochester,N.Y., del.	54.63	55.13	55.63	....
Syracuse,N.Y.,del.	55.58	56.08	56.58	....
Chicago District				
Chicago I-3	52.00	52.50	52.50	53.00
Gary,Ind. U5	52.00	....	52.50	....
IndianaHarbor,Ind. I-2	52.00	....	52.50	....
So.Chicago,Ill. W14	52.00	52.50	52.50	....
So.Chicago,Ill., Y1	52.00	52.50	52.50	....
So.Chicago,Ill. U5	52.00	....	52.50	53.00
Milwaukee,del.	53.89	54.39	54.39	54.89
Muskegon,Mich.,del.	....	57.98	57.98	....
Cleveland District				
Cleveland A7	52.00	52.50	52.50	53.00
Cleveland R2	52.00	52.50	52.50	....
Akron, del. from Cleve.	54.39	54.89	54.89	54.39
Lorain,O. N3	52.00	....	....	53.00
Duluth I-3	....	....	52.50	....
Erie,Pa. I-3	52.00	52.50	52.50	53.00
Everett,Mass. E1	....	53.25	53.75	....
Fontana,Calif. K1	58.00	58.50	....	....
Geneva,Utah G1	52.00	52.50	....	....
Seattle,Tacoma,Wash.,del.	....	60.20	....	....
Portland,Oreg.,del.	....	60.20	....	....
LosAngeles,SanFrancisco,del.	59.70	60.20	....	....
GraniteCity,Ill. M10	53.90	54.40	54.90	....
St.Louis,del. (inc. tax)	54.65	55.15	55.65	....
Ironton,Utah C11	52.00	52.50	....	....
LoneStar,Tex. L6	48.00	*48.50	48.50	....
Minnequa,Colo. C10	54.00	55.00	55.00	....
Pittsburgh District				
NevilleIsland,Pa. P6	....	52.50	52.50	53.00
Pitts.,N&S. sides, Ambridge, Aliquippa,del.	....	53.69	53.69	54.19
McKeesRocks,del.	....	53.45	53.45	53.95
Lawrenceville,Homestead, McKeesport,Monaca,del.	....	53.94	53.94	54.44
Verona,del.	....	54.40	54.40	54.90
Brackenridge,del.	....	54.63	54.63	55.13
Bessemer,Pa. U5	52.00	....	52.50	53.00
Clairton,Rankin,So.Duquesne,Pa. U5	52.00	....	....	....
McKeesport,Pa. N3	52.00	....	....	53.00
Monessen,Pa. P7	54.00	....	....	....
Sharpsville,Pa. S6	....	....	52.50	53.00
Steelton,Pa. B2	54.00	54.50	55.00	55.50
Swedeland,Pa. A3	56.00	56.50	57.00	57.50
Toledo,O. I-3	52.00	52.50	52.50	53.00
Cincinnati,del.	57.01	57.51	....	....
Troy,N.Y. R2	54.00	54.50	55.00	55.50
Youngstown District				
Hubbard,O. Y1	52.00	52.50	52.50	....
Youngstown Y1	52.00	52.50	52.50	....
Mansfield,O.,del.	56.26	56.76	56.76	57.26

* Low phos; southern grade.

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si over base grade, 1.7 2.25%.

Phosphorus: Deduct 38 cents per ton for P content of 0.70% and ove

Manganese: Add 50 cents per ton for each 0.50% manganese over 1 or portion thereof.

Nickel: Under 0.50% no extra; 0.50-0.74%, incl., add $2 per ton an each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1.50 for each 0.5% Si)

Jackson,O. G2, J1	$62
Buffalo H1	63

ELECTRIC FURNACE SILVERY PIG IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1 f each 0.5% Mn over 1%; $1 for each 0.045% max. P)

NiagaraFalls,N.Y. P15	$83
Keokuk,Iowa, Openhearth & Fdry, frt, allowed K2	92
Keokuk, OH & Fdry., 12½ lb. piglets, 16% Si, frt. allowed K2	95
Wenatchee,Wash., O.H. & Fdry., frt. allowed K2	92

CHARCOAL PIG IRON, Gross Ton

(Low phos. semi-cold blast; differential charged for silicon over base grade; also for hard chilling iron Nos. 5 & 6)

Lyles,Tenn. T3	$66

LOW PHOSPHOROUS PIG IRON, Gross Ton

Cleveland, intermediate, A7	$57.0
Steelton,Pa. B2	60
Philadelphia delivered	63
Troy,N.Y. R2	60

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Semifinished and Finished Steel Products

Mill prices as reported to STEEL Jan. 4, 1951; cents per pound except as otherwise noted. Changes shown in italics. Code numbers following mill points indicate producing company; key on next two pages.

Carbon, Forging (NT)
Calif. K1 ....$9.00
,Pa. U5 .....52.00
Alloy (NT)
R7 .....$54.00
.,Calif. K1 ....80.00
.,Tex. S5 .....62.00
,Pa. C18 .....54.00
,Pa. U5 .....54.00
iesne,Pa. U5 ..54.00

BLOOMS & Slabs
bon, Rerolling (NT)
er,Pa. U5 ....$56.00
i,Pa. U5 .....56.00
Ala. T2 .....56.00
d,Ala. T2 .....56.00
i,Calif. K1 ....75.00
d. U5 .....56.00
wn,Pa. B2 ....56.00
anna,N.Y. B2 ..56.00
1,Pa. U5 .....56.00
ago,Ill. U5 ....56.00
iesne,Pa. U5 ..56.00

rbon, Forging (NT)
er,Pa. U5 ....$66.00
R2 .....66.00
O. R2 .....66.00
i,Pa. U5 .....66.00
nd R2 .....66.00
ocken,Pa. A3 ..73.00
R7 .....69.00
Ala. T2 .....66.00
d,Ala. T2 .....66.00
a,Calif. K1 ....85.00
d. U5 .....66.00
,Utah G1 .....66.00
n,Tex. S5 .....74.00
own,Pa. B2 ....66.00
vanna,N.Y. B2 ..66.00
geles B3 .....85.00
l,Pa. U5 .....66.00
B3 .....85.00
ago R2, U5 ....66.00
ago W14 .....63.00
uesne,Pa. U5 ..66.00
Francisco B3 ..85.00

lloy, Forging (NT)
em,Pa. B2 ....$70.00
) R2 .....70.00
,O. R2 .....70.00
,O.(29) T7 ....66.00
hocken,Pa. A3 ..77.00
R7 .....73.00
a,Calif. K1 ....89.00
nd. U5 .....70.00
n,Tex. S5 .....78.00
rbor,Ind. Y1 ....66.00
own,Pa. B2 ....70.00
wanna,N.Y. B2..70.00
geles B3 .....90.00
on,O. R2 .....70.00
d,Pa. C18 .....70.00
ll,Pa. U5 .....70.00
ago R2, U5 ....70.00
cago W14 .....66.00
uesne,Pa. U5 ..70.00
n,O. C17 .....70.00

S, SEAMLESS TUBE (NT)
i,O. R2 .....$82.00
nd R2 .....82.00
ia,Calif. K1 ....103.00
nd. U5 .....82.00
on,O. R2 .....82.00
cago,Ill. R2 ....82.00
uesne,Pa. U5 ...82.00

BARS (NT)
na,Calif. K1 ...$89.00

ppa,Pa. J5 .....3.45
ill,Pa. U5 .....3.35
n,O. R2 .....3.35
stown R2, U5 ...3.35

RODS
naCity,Ala. R2 ..4.10
o W12 .....4.10
and A7 .....4.10
a,Pa. A7 .....4.10
eld,Ala. T2 .....4.10
na,Calif. K1 ....4.90
n,Tex. S5 .....4.50
own,Pa. B2 ....4.10
Ill. A7 .....4.10
geles B3 .....4.90
qua,Colo. C10 ....4.35
sen,Pa. P7 .....4.30
nawanda,N.Y.B11 4.10
urg,Calif. C11 ....4.75
mouth,O. P12 ....4.30
ng,N.J. R5 .....4.20
icago,Ill. R2 ....4.10
owsPoint,Md. B2..4.20
g,Ill.(1) N15 ....4.10
ers,O. Y1 .....4.10
nce,Calif. C11 ....4.90
ster A7 .....4.40

STRUCTURALS
Carbon Steel Stand. Shapes
AlabamaCity,Ala. R2 ..3.70
Aliquippa,Pa. J5 .....3.65
Bessemer,Ala. T2 .....3.65
Bethlehem,Pa. B2 .....3.70
Clairton,Pa. U5 .....3.65
Fairfield,Ala. T2 .....3.65
Fontana,Calif. K1 .....4.25
Gary,Ind. U5 .....3.65
Geneva,Utah G1 .....3.65
Houston,Tex. S5 .....4.05
Ind.Harbor,Ind. I-2 ....3.65
Johnstown,Pa. B2 .....3.70
KansasCity,Mo. S5 ....4.25
Lackawanna,N.Y. B2 ..3.70
LosAngeles B3 .....4.25
Minnequa,Colo. C10 ....4.10
Munhall,Pa. U5 .....3.65
Niles,Calif.(22) P1 ....4.85
Phoenixville,Pa. P4 ....4.95
Portland,Oreg. O4 .....4.50
Seattle B3 .....4.30
So.Chicago,Ill. U5, W14.3.65
So.SanFrancisco B3 ...4.20
Torrance,Calif. C11 ....4.25
Weirton,W.Va. W6 ....3.90
Alloy Stand. Shapes
Clairton,Pa. U5 .....4.35
Fontana,Calif. K1 .....5.55
Munhall,Pa. U5 .....4.35
So.Chicago,Ill. U5 .....4.35
H.S., L.A. Stand. Shapes
Aliquippa,Pa. J5 .....5.50
Bessemer,Ala. T2 .....5.50
Bethlehem,Pa.(14) B2 ..5.50
Clairton,Pa. U5 .....5.50
Fairfield,Ala. T2 .....5.50
Fontana,Calif. K1 .....6.10
Gary,Ind. U5 .....5.50
Geneva,Utah G1 .....5.50
Ind.Harbor,Ind. I-2 ....5.50
Ind.Harbor,Ind. Y1 ....6.00
Johnstown,Pa. B2 .....5.50
Lackawanna,N.Y.(14)B2 5.50
LosAngeles B3 .....6.05
Munhall,Pa. U5 .....5.50
Seattle B3 .....6.10
So.Chicago,Ill. U5 .....5.50
So.SanFrancisco B3 ....6.00
Struthers,O. Y1 .....6.00
Wide Flange
Bethlehem,Pa. B2 .....3.70
Fontana,Calif. K1 .....4.65
Lackawanna,N.Y. B2 ...3.70
Munhall,Pa. U5 .....3.65
So.Chicago,Ill. U5 .....3.65
H.S., L.A. Wide Flange
Bethlehem,Pa. B2 .....5.50
Lackawanna,N.Y. B2 ...5.50
Munhall,Pa. U5 .....5.45
So.Chicago,Ill. U5 .....5.45
SHEET STEEL PILING
Ind.Harbor,Ind. I-2 ...4.45
Lackawanna,N.Y. B2 ...4.45
Munhall,Pa. U5 .....4.45
So.Chicago,Ill. U5 .....4.45
BEARING PILES
Munhall,Pa. U5 .....3.65
So.Chicago,Ill. U5 .....3.65
PLATES,High-Strength Low-Alloy
Aliquippa,Pa. J5 .....5.65
Bessemer,Ala. T2 .....5.65
Clairton,Pa. U5 .....5.65
Cleveland J5, R2 .....5.65
Conshohocken,Pa. A3 ..5.90
Ecorse,Mich. G5 .....5.85
Fairfield,Ala. T2 .....5.65
Fontana,Calif.(30) K1 ..6.25
Gary,Ind. U5 .....5.65
Geneva,Utah G1 .....5.65
Ind.Harbor,Ind. I-2 ....5.65
Ind.Harbor,Ind. Y1 ....6.15
Johnstown,Pa. B2 .....5.65
Munhall,Pa. U5 .....5.65
Pittsburgh J5 .....5.65
Seattle B3 .....6.55
Sharon,Pa. S3 .....5.70
So.Chicago,Ill. U5 .....5.65
SparrowsPoint,Md. B2 ..5.65
Warren,O. R2 .....5.65
Youngstown Y1 .....6.15
PLATES, Open-Hearth Alloy
Claymont,Del. W16 ....4.85
Coatesville,Pa. L7 .....5.25
Conshohocken,Pa. A3 ..5.05
Fontana,Calif. K1 .....5.70
Gary,Ind. U5 .....4.75
Johnstown,Pa. B2 .....4.75
Munhall,Pa. U5 .....4.75
Sharon,Pa. S3 .....5.20
So.Chicago,Ill. U5 .....4.75
SparrowsPoint,Md. B2..4.75
FLOOR PLATES
Cleveland J5 .....4.75
Conshohocken,Pa. A3 ...4.75
Harrisburg,Pa. C5 .....5.95
Ind.Harbor,Ind. I-2 ...4.75
Munhall,Pa. U5 .....4.75
So.Chicago,Ill. U5 .....4.75
PLATES, Carbon A.R.
Fontana,Calif. K1 .....5.45
PLATES, Carbon Steel
AlabamaCity,Ala. R2 ..3.70
Aliquippa,Pa. J5 .....3.70
Ashland,Ky(15) A10 ..3.70
Bessemer,Ala. T2 .....3.70
Clairton,Pa. U5 .....3.70
Claymont,Del. W16 ....4.15
Cleveland J5, R2 .....3.70
Coatesville,Pa. L7 .....4.15
Conshohocken,Pa. A3 ..4.15
Ecorse,Mich. G5 .....3.75
Fairfield,Ala. T2 .....3.70
Fontana,Calif.(30) K1 ..4.30
Gary,Ind. U5 .....3.70
GraniteCity,Ill. G4 .....4.40
Geneva,Utah G1 .....3.70
Harrisburg,Pa. C5 .....4.95
Houston,Tex. S5 .....4.10
Ind.Harbor,Ind. I-2, Y1.3.70
Johnstown,Pa. B2 .....3.70
Lackawanna,N.Y. B2 ..3.70
Minnequa,Colo. C10 ....4.50
Munhall,Pa. U5 .....3.70
Pittsburgh J5 .....3.70
Seattle B3 .....4.60
Sharon,Pa. S3 .....3.95
So.Chicago,Ill. U5, W14.3.70
SparrowsPoint,Md. B2..3.70
Steubenville,O. W10 ....3.70
Warren,O. R2 .....3.70
Weirton,W.Va. W6 .....4.00
Youngstown R2, U5, Y1.3.70
PLATES, Wrought Iron
Economy,Pa. B14 .....8.60
PLATES, Ingot Iron
Ashland,c.l.(15) A10 ..3.95
Ashland,lcl.(15) A10 ..4.45
Cleveland,c.l. R2 .....4.30
Warren,O. c.l. R2 .....4.30
BARS, Hot-Rolled Carbon
AlabamaCity,Ala. R2 ..3.70
Aliquippa,Pa. J5 .....3.70
Alton,Ill.(1) L1 .....3.45
Atlanta,Ga. A11 .....4.25
Bessemer,Ala. T2 .....3.70
Buffalo R2 .....3.70
Canton,O. R2 .....3.70
Clairton,Pa. U5 .....3.70
Cleveland R2 .....3.70
Detroit R7 .....3.85
Ecorse,Mich G5 .....3.65
Emeryville,Calif. J7 ....4.45
Fairfield,Ala. T2 .....3.70
Fontana,Calif. K1 .....4.40
Gary,Ind. U5 .....3.70
Houston,Tex. S5 .....4.10
Ind.Harbor,Ind. I-2, Y1.3.70
Johnstown,Pa. B2 .....3.70
KansasCity,Mo. S5 ....4.30
Lackawanna,N.Y. B2 ..3.70
LosAngeles B3 .....4.40
Milton,Pa. B6 .....4.20
Minnequa,Colo. C10 ....4.15
Niles,Calif. P1 .....4.17
N.Tonawanda,N.Y. B11.3.70
Pittsburg,Calif. C11 ....4.40
Pittsburgh J5 .....3.70
Portland,Oreg. O4 .....4.65
Seattle B3, N14 .....4.45
So.Chicago R2, U5, W14.3.70
So.Duquesne,Pa. U5 ....3.70
So.SanFran.,Cal. B3 ....4.45
Struthers,O. Y1 .....3.70
Torrance,Calif. C11 ....4.40
Weirton,W.Va. W6 ....3.85
Youngstown R2, U5 ....3.70
BAR SIZE ANGLES; S. SHAPES
Aliquippa,Pa. J5 .....3.70
Atlanta A11 .....4.25
Johnstown,Pa. B2 .....3.70
Lackawanna,N.Y. B2 ...3.70
Niles,Calif. P1 .....5.05
Portland,Oreg. O4 .....4.65
SanFrancisco S7 .....4.85
BAR SIZE ANGLES; H.R.CARBON
Bethlehem,Pa. B2 .....3.90
BARS, Hot-Rolled Alloy
Bethlehem,Pa. B2 .....4.30
Buffalo R2 .....4.30
Canton,O. R2 .....4.30
Canton,O.(29) T7 .....3.95
Clairton,Pa. U5 .....4.30
Detroit R7 .....4.45
Ecorse,Mich. G5 .....4.25
Fontana,Calif. K1 .....5.35
Gary,Ind. U5 .....4.30
Houston,Tex. S5 .....4.70
Ind.Harbor,Ind. I-2, Y1.4.30
Johnstown,Pa. B2 .....4.30
KansasCity,Mo. S5 ....4.90
Lackawanna,N.Y. B2 ..4.30
LosAngeles B3 .....5.35
Massillon,O. R2 .....4.30
Midland,Pa. C18 .....4.30
So.Chicago R2, U5, W14.4.30
So.Duquesne,Pa. U5 ....4.30
Struthers,O. Y1 .....4.30
Warren,O. C17 .....4.30
Youngstown U5 .....4.30
BAR SHAPES, Hot-Rolled Alloy
Clairton,Pa. U5 .....4.55
Fontana,Calif. K1 .....5.30
Gary,Ind. U5 .....4.55
Youngstown U5 .....4.55
BARS & SMALL SHAPES, H.R., High-Strength Low-Alloy
Aliquippa,Pa. J5 .....5.55
Atlanta A11 .....5.35
Bessemer,Ala. T2 .....5.55
Bethlehem,Pa. B2 .....5.55
Clairton,Pa. U5 .....5.55
Cleveland R2 .....5.55
Ecorse,Mich. G5 .....5.65
Fairfield,Ala. T2 .....5.55
Fontana,Calif. K1 .....6.60
Gary,Ind. U5 .....5.55
Ind.Harbor,Ind. I-2 ...5.55
IndianaHarbor,Ind. Y1..6.05
Johnstown,Pa. B2 .....5.55
Lackawanna,N.Y. B2 ...5.55
LosAngeles B3 .....6.25
Pittsburgh J5 .....5.55
Seattle B3 .....6.30
So.Duquesne,Pa. U5 ....5.55
So.SanFrancisco B3 ....6.30
Struthers,O. Y1 .....6.05
Youngstown U5 .....5.55
BARS, Cold-Finished Carbon
Ambridge,Pa. W18 ....4.55
BeaverFalls,Pa.M12,R2 ..4.55
Buffalo B5 .....4.60
Camden,N.J. P13 .....5.00
Carnegie,Pa. C12 .....4.55
Chicago W18 .....4.55
Cleveland A7, C20 .....4.55
Detroit P17 .....4.70
Donora,Pa. A7 .....4.55
Ecorse,Mich. G5 .....4.35
Elyria,O. W8 .....4.55
FranklinPark,Ill. N5 ...4.55
Gary,Ind. R2 .....4.55
GreenBay,Wis. F7 ....4.55
Hammond,Ind. L2, M13.4.55
Hartford,Conn. R2 .....5.10
Harvey,Ill. B5 .....4.55
LosAngeles R2 .....6.00
Mansfield,Mass. B5 ....5.10
Massillon,O. R8 .....4.55
Midland,Pa. C18 .....4.55
Monaca,Pa. S17 .....4.55
Newark,N.J. W18 .....5.00
Plymouth,Mich. P5 .....4.80
Pittsburgh J5 .....4.55
Putnam,Conn. W18 .....5.10
Readville,Mass. C14 ....5.10
St. Louis,Mo. M5 .....4.95
So.Chicago,Ill. W14 ....4.55
SpringCity,Pa.(5) K3 ...5.00
Struthers,O. Y1 .....4.55
Waukegan,Ill. A7 .....4.55
Youngstown F3, Y1 ....4.55
BARS, Cold-Finished Alloy
Ambridge,Pa. W18 ....5.40
BeaverFalls,Pa. M12 ...5.40
Bethlehem,Pa. B2 .....5.40
Buffalo B5 .....5.40
Camden,N.J. P13 .....5.80
Canton,O. R2 .....5.40
Canton,O.(29) T7 .....4.90
Carnegie,Pa. C12 .....5.40
Chicago W18 .....5.40
Cleveland A7 .....5.45
Cleveland C20 .....5.40
Detroit P17 .....5.55
Donora,Pa. A7 .....5.45
Elyria,O. W8 .....5.40
Gary,Ind. R2 .....5.40
Hammond,Ind. L2, M13.5.40
Hartford,Conn. R2 .....5.85
Harvey,Ill. B5 .....5.40
Lackawanna,N.Y. B2 ...5.40
Mansfield,Mass. B5 ....5.85
Massillon,O. R2, R8 ...5.40
Midland,Pa. C18 .....5.40
Monaca,Pa. S17 .....5.40
Newark,N.J. W18 .....5.75
Plymouth,Mich. P5 .....5.60
So.Chicago,Ill. R2, W14.5.40
Struthers,O. Y1 .....5.40
Warren,O. C17 .....5.40
Waukegan,Ill. A7 .....5.45
Worcester,Mass. A7 ....5.75
Youngstown F3, Y1 ....5.40
RAIL STEEL BARS
ChicagoHts.(3,4)I-2, C2.4.75
Dallas,Tex.(4) S20 ....6.00
Franklin,Pa.(3,4) F5 ...4.75
FortWorth,Tex.(26) T4.4.63
Huntngtn,W.Va.(3) W7 .5.50
Marion,O.(3) P11 .....4.75
Moline,Ill.(3) R2 .....3.80
Tonawanda(3,4) B12 ...4.75
Williamsport(3) S19 ....5.00
Williamsport(4) S19 ....5.10
BARS, Wrought Iron
Dover,N.J.(Staybolt)U1 15.00
Dover(Eng.Bolt) U1 ..13.50
Dover(Wrgt.Iron) U1 .12.25
Economy,Pa.(S.R.) B14.9.60
Economy,Pa.(D.R.)B14 11.90
Economy(Staybolt)B14 12.20
McK.Rks.(Staybolt) L5.14.50
McK.Rks.(S.R.) L5 ...9.60
McK.Rks.(D.R.) L5 ..13.00
BARS, Reinforcing (Fabricators)
AlabamaCity,Ala. R2 ..3.70
Alton,Ill.(6) L1 .....3.45
Atlanta A11 .....4.25
Buffalo R2 .....3.70
Cleveland R2 .....3.70
Emeryville,Calif. J7 ....4.45
Fairfield,Ala. T2 .....3.70
Fontana,Calif. K1 .....4.40
Gary,Ind. U5 .....3.70
Houston,Tex. S5 .....4.10
Ind.Harbor,Ind. I-2, Y1.3.70
Johnstown,Pa. B2 .....3.70
KansasCity,Mo. S5 ....4.30
Lackawanna,N.Y. B2 ..3.70
LosAngeles B3 .....4.40
Milton,Pa. B6 .....4.20
Minnequa,Colo. C10 ....4.15
Monaca,Pa. S17 .....4.55
Newark,N.J. W18 .....5.00
Plymouth,Mich. P5 .....4.80
Pittsburgh J5 .....4.55
Putnam,Conn. W18 .....5.10
Readville,Mass. C14 ....5.10
St. Louis,Mo. M5 .....4.95
So.Chicago,Ill. W14 ....4.55
SpringCity,Pa.(5) K3 ...5.00
Struthers,O. Y1 .....4.55
Waukegan,Ill. A7 .....4.55
Youngstown F3, Y1 ....4.55
BARS, Reinforcing (Fabricated; to Consumers)
Huntington,W.Va. W7 ..5.50
Johnstown, ¼-1" B2 ..4.75
LosAngeles B3 .....5.45
Marion,O. P11 .....5.00
Seattle B3, N14 .....5.55
So.SanFrancisco B3 ....5.45
SparrowsPt, ¼-1" B2..4.75
Williamsport,Pa. S19 ...5.10
SHEETS, Hot-Rolled Steel
(18 gage and heavier)
AlabamaCity,Ala. R2 ..3.60
Ashland,Ky.(8) A10 ...3.60
Butler,Pa. A10 .....3.60
Cleveland J5, R2 .....3.60
Conshohocken,Pa. A3 ..4.00
Detroit M1 .....4.40
Dover,O. R1 .....5.65
Ecorse,Mich.(8) G5 ...3.80
Fairfield,Ala. T2 .....3.60
Fontana,Calif. K1 .....4.55
Gary,Ind. U5 .....3.60
GraniteCity,Ill. G4 ....4.30
Geneva,Utah G1 .....3.70
Ind.Harbor,Ind. I-2, Y1.3.60
Irvin,Pa. U5 .....3.60
Lackawanna,N.Y. B2 ..3.60
Munhall,Pa. U5 .....3.60
Niles,O. N12 .....5.25
Pittsburg,Calif. C11 ....4.30
Pittsburgh J5 .....3.60
Sharon,Pa. S3 .....4.00
So.Chicago,Ill. W14 ....3.60
SparrowsPoint,Md. B2 ..3.60
Steubenville,O. W10 ....3.60
Torrance,Calif. C11 ....4.30
Warren,O. R2 .....3.60
Weirton,W.Va. W6 ....3.60
WestLeechburg,Pa. A4..3.75
Youngstown U5, Y1 ....3.60
SHEETS, H-R (19 gage)
AlabamaCity,Ala. R2 ..4.75
Ind.Harbor,Ind. I-2 ....5.40
Mansfield,O. E6 .....5.65
Niles,O. N12 .....5.75
Torrance,Calif. C11 ....5.40
SHEETS, H-R (14-ga., heavier) High-Strength Low-Alloy
Cleveland J5, R2 .....5.40
Conshohocken,Pa. A3 ..5.65
Ecorse,Mich. G5 .....5.50
Fairfield,Ala. T2 .....5.40
Fontana,Calif. K1 .....6.35
Gary,Ind. U5 .....5.40
Ind.Harbor,Ind. I-2 ....5.40
IndianaHarbor,Ind. Y1..5.90
Irvin,Pa. U5 .....5.40
Lackawanna(35) B2 ....5.40
Pittsburgh J5 .....5.40
Sharon,Pa. S3 .....5.40
So.Chicago,Ill. U5 .....5.40
SparrowsPoint(36) B2 ..5.40
Warren,O. R2 .....5.40
Weirton,W.Va. W6 ....5.75
Youngstown U5 .....5.40
Youngstown Y1 .....5.90
SHEETS, Cold-Rolled High-Strength Low-Alloy
Cleveland J5, R2 .....6.55
Ecorse,Mich. G5 .....6.65
Fontana,Calif. K1 .....7.50
Gary,Ind. U5 .....6.55
IndianaHarbor,Ind. Y1 .7.05
IndianaHarbor,Ind. I-2 .6.55
Irvin,Pa. U5 .....6.55
Lackawanna(37) B2 ....6.55
Pittsburgh J5 .....6.55
SparrowsPoint(38) B2 ..6.55
Warren,O. R2 .....6.55
Weirton,W.Va. W6 .....6.90
Youngstown Y1 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

Butler,Pa. A10	4.35
Cleveland J5, R2	4.35
Ecorse,Mich. G5	4.55
Fairfield,Ala. T2	4.35
Follansbee,W.Va. F4	5.35
Fontana,Calif. K1	5.30
Gary,Ind. U5	4.35
GraniteCity,Ill. G4	5.05
Ind.Harbor,Ind. I-2, Y1	4.35
Irvin,Pa. U5	4.35
Lackawanna,N.Y. B2	4.35
Middletown,O. A10	4.35
Pittsburg,Calif. C11	5.30
Pittsburgh J5	4.35
SparrowsPoint,Md. B2	4.35
Steubenville,O. W10	4.35
Warren,O. R2	4.35
Weirton,W.Va. W6	4.35
Youngstown Y1	4.35

SHEETS, Galv'd No. 10 Steel

AlabamaCity,Ala., R2	4.80
Ashland,Ky.(8) A10	4.80
Canton,O. R2	4.80
Dover,O. R1	5.50
Fairfield,Ala. T2	4.80
Gary,Ind. U5	4.80
GraniteCity,Ill. G4	5.50
Ind.Harbor,Ind. I-2	4.80
Irvin,Pa. U5	4.80
Kokomo,Ind.(13) C16	5.20
MartinsFerry,O. W10	4.80
Niles,O. N12	6.00
Pittsburg,Calif. C11	5.55
SparrowsPoint,Md. B2	4.80
Steubenville,O. W10	4.40
Torrance,Calif. C11	5.55
Weirton,W.Va. W6	4.80

SHEETS, Galvanized No. 10, High-Strength Low Alloy

Irvin,Pa. U5	7.20
SparrowsPoint(39) B2	6.75

SHEETS, Galvannealed Steel

Canton,O. R2	5.35
Irvin,Pa. U5	5.35
Kokomo,Ind.(13) C16	5.75
Niles,O. N12	6.55

SHEETS, ZINCGRIP Steel No. 10

Butler,Pa. A10	5.05
Middletown,O. A10	5.05

SHEETS, Electro Galvanized

Cleveland R2 (28)	5.65
Niles,O. R2 (28)	5.65
Weirton,W.Va. W6	5.50

SHEETS, Zinc Alloy

Ind.Harbor,Ind. I-2	5.70

SHEETS, Long Terne Steel (Commercial Quality)

BeechBottom,W.Va.W10	5.20
Gary,Ind. U5	5.20
Mansfield,O. E6	6.05
Middletown,O. A10	5.20
Niles,O. N12	6.00
Weirton,W.Va. W6	5.20

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10	5.60

MANUFACTURING TERNES (Special Coated)

Fairfield,Ala. T2	$7.60
Gary Ind. U5	7.50
Irvin,Pa. U5	7.50
SparrowsPoint,Md. B2	7.60
Yorkville,O. W10	7.50

SHEETS, Lt. Coated Ternes, 6 lb

Yorkville,O. W10	$8.40

SHEETS, Mfg. Ternes, 8 lb (Commercial Quality)

Gary,Ind. U5	$9.50
Warren,O. R2	9.50
Yorkville,O. W10	9.50

ROOFING SHORT TERNES (Package; 8 lb coated)

Gary,Ind. U5	$17.50

BLUED Stock, 29 Ga.

Yorkville,O. W10	6.80
Follansbee,W.Va.(23) F4	6.85

SHEETS, Culvert No. 16	Cu Alloy	Cu Fe
Ashland A10	5.60	...
Canton,O. R2	5.65	6.10
Fairfield,Ala. T2	5.60	5.85
Gary U5	5.60	5.85
IndianaHarbor I-2	5.60	5.85
Irvin,Pa. U5	5.60	5.85
Kokomo C16	6.25	...
MartinsFy,O. W10	5.60	5.85
Pittsburg,Cal. C11	6.35	...
SparrowsPt. B2	5.60	...
Torrance,Cal. C11	6.35	...

SHEETS, Culvert, No. 16 Corrugated Ingot Iron

Ashland,Ky. A10	5.85
Fairfield,Ala. T2	5.60

SHEETS, Hot-Rolled Ingot Iron 18 Gage and Heavier

Ashland(8) A10	3.85
Cleveland R2	4.20
Ind.Harbor,Ind. I-2	3.85
Warren,O. R2	4.20

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2	4.95
Middletown,O. A10	4.85
Warren,O. R2	4.95

SHEETS, Galvanized Ingot Iron No. 10 flat

Ashland,Ky.(8) A10	5.05
Canton,O. R2	5.55

SHEETS, ZINCGRIP Ingot Iron

Butler,Pa. A10	5.30
Middletown,O. A10	5.30

SHEETS, Enameling Iron

Ashland,Ky.(8) A10	4.65
Cleveland R2	4.65
Ecorse,Mich. G5	4.70
Gary,Ind. U5	4.65
GraniteCity,Ill. G4	5.35
Ind.Harbor,Ind. I-2	4.65
Irvin,Pa. U5	4.65
Middletown,O. A10	4.65
Youngstown Y1	4.65

SHEETS, Drum Body

Pittsburg,Calif. C11	4.30
Torrance,Calif. C11	4.30

SHEETS, Well Casing

Fontana,Calif. K1	5.10
TorranceCalif. C11	5.10

TIN PLATE, American Coke (Base Box)	1.25 lb	1.50 lb
Aliquippa J5	$8.45	$8.70
Fairfield,Ala. T2	8.55	8.80
Gary U5	8.45	8.70
Ind.Har. I-2, Y1	8.45	8.70
Irvin,Pa. U5	8.45	8.70
Pitts,Cal. C11	9.20	9.40
Sp.Pt.,Md. B2	8.55	8.75
Warren R2	8.45	8.70
Weirton W6	8.45	8.70
Yorkville,O. W10	8.45	8.70

CANMAKING BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$6.25
Fairfield,Ala. T2	6.35
Gary,Ind. U5	6.25
GraniteCity,Ill. G4	6.45
Ind.Harbor,Ind. I-2, Y1	6.25
Irvin,Pa. U5	6.25
Niles,O. R2	6.25
Pittsburg,Calif. C11	7.00
SparrowsPoint,Md. B2	6.35
Warren,O. R2	6.25
Weirton,W.Va. W6	6.25
Yorkville,O. W10	6.25

HOLLOWARE ENAMELING Black Plate (29 gage)

Follansbee,W.Va. F4	5.85
Gary,Ind. U5	5.85
GraniteCity,Ill. G4	6.05
Ind.Harbor,Ind. Y1	5.30
Irvin,Pa. U5	5.85
Niles,O. R2	5.30
SparrowsPoint,Md. B2	5.40
Warren,O. R2	5.30
Yorkville,O. W10	6.15

SHEETS, ALUMINIZED

Butler,Pa. A10	8.15

STRIP, Hot-Rolled, High-Strength Low-Alloy

Atlanta(9) A11	5.10
Bessemer,Ala. T2	5.30
Conshohocken,Pa. A3	5.55
Ecorse,Mich. G5	5.40
Fairfield,Ala. T2	5.30
Fontana,Cal. K1	6.20
Gary,Ind. U5	5.30
Ind.Harb.,Ind. I-2	5.30
IndianaHarbor,Ind. Y1	5.80
Lackawanna,N.Y. B2	4.95
LosAngeles(25) B3	6.05
Seattle B3	6.30
Sharon,Pa. S3	5.40
So.SanFrancisco(25) B3	6.05
SparrowsPoint,Md. B2	4.95
Warren,O. R2	5.30
Weirton,W.Va. W6	5.75
Youngstown Y1	5.80
Youngstown U5	5.30

STRIP, Cold-Rolled, High-Strength Low-Alloy

Cleveland A7, J5	6.70
Dover,O. G6	7.30
Ecorse,Mich. G5	6.65
Fontana,Calif. K1	6.95
Lackawanna,N.Y. B2	6.40
Sharon,Pa. S3	6.55
SparrowsPoint,Md. B2	6.40
Warren,O. R2	6.55
Weirton,W.Va. W6	7.20
Youngstown Y1	7.05

STRIP, Cold-Rolled Alloy Steel

Bridgeprt,Conn.(10)S15	10.10
Carnegie,Pa. S15	10.60
Cleveland A7	10.00
Dover,O. G6	10.50
Fontana,Calif. K1	11.65
Harrison,N.J. C18	10.60
NewBritn.Conn.(10)S15	10.10
Pawtucket,R.I.(11) N8	10.75
Pawtucket,R.I.(12) N8	11.05
Sharon,Pa. S3	10.60
Worcester,Mass. A7	10.30
Youngstown C8	10.60

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2	3.50
Alton,Ill.(1) L1	3.25
Ashland,Ky.(8) A10	3.50
Atlanta A11	4.05
Bessemer, Ala. T2	3.50
Bridgeprt,Conn.(10) S15	4.00
Buffalo(27) R2	3.50
Butler,Pa. A10	3.50
Carnegie,Pa. S18	4.00
Conshonocken,Pa. A3	3.90
Detroit M1	4.40
Ecorse.Mich. G5	3.45
Fairfield,Ala. T2	3.50
Fontana,Calif. K1	4.75
Gary,Ind. U5	3.50
Houston,Tex. S5	4.90
Ind.Harbor,Ind. I-2, Y1	3.50
Johnstown,Pa.(25) B2	3.50
KansasCity,Mo.(9) S5	4.10
Lackawanna,N.Y.(32)B2	3.50
LosAngeles B3	4.25
Milton,Pa. B6	4.00
Minnequa,Colo. C10	4.55
NewBritain(10) S15	4.00
N.Tonawanda,N.Y. B11	3.50
Pittsburg,Calif. C11	4.25
Riverdale,Ill. A1	3.50
SanFrancisco S7	4.85
Seattle B3. N14	4.50
Sharon,Pa S3	4.00
So.Chicago,Ill. W14	3.50
So.SanFrancisco B3	4.25
SparrowsPoint,Md. B2	3.50
Torrance,Calif. C11	4.25
Warren,O. R2	3.50
Weirton,W.Va. W6	3.60
WestLeechburg,Pa. A4	3.75
Youngstown U5, Y1	3.50

STRIP, Hot-Rolled Alloy

Bridgeprt,Conn.(10) S15	5.45
Carnegie,Pa. S18	5.85
Fontana,Calif. K1	6.70
Gary,Ind. U5	5.50
Houston,Tex. S5	5.90
KansasCity,Mo. S5	6.10
NewBritn,Conn.(10) S15	5.45
Sharon,Pa. S3	5.85
Youngstown U5	5.50

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	3.75
Warren,O. R2	4.10

STRIP, Cold-Finished, Spring Steel (Annealed)

	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Berea,O. C7	...	6.80	7.40	9.35	11.65
Bridgeport,Conn.(10) S15	5.35	6.80	7.40	9.35	11.65
Bristol,Conn. W1	...	...	7.70	9.65	...
Carnegie,Pa. S18	...	6.80	7.40	9.35	11.65
Cleveland A7	4.65	6.45	7.40	9.35	11.65
Dearborn,Mich. D3	*5.60*	*7.05*	*7.65*	...	...
Detroit D2	5.60	6.65	7.25	...	...
Dover,O. G6	5.50	6.80	7.40	9.35	11.65
Franklin,Park,Ill. T6	5.00	6.60	7.55	9.50	11.80
Harrison,N.J. C18	...	...	7.70	9.65	11.90
Mattapan,Mass. T6	5.50	6.75	7.70	9.65	11.90
NewBritn.,Conn.(10) S15	5.35	6.80	7.40	9.35	11.65
NewCastle,Pa. B4	5.35	6.80	7.40	9.35	...
NewCastle,Pa. E5	5.50	6.80	7.40	9.35	11.65
NewHaven,Conn. D2	5.85	6.75	7.35	...	...
NewYork W3	...	7.10	7.70	9.65	11.90
Pawtucket,R.I. N8:					
Cleve-or-Pitts.Base	...	6.80	7.40	9.35	11.65
Worcester,Base	5.85	7.10	7.70	9.65	11.90
Sharon,Pa. S3	5.35	6.80	7.40	9.35	11.65
Trenton,N.J. R5	...	7.10	7.70	9.65	11.90
Wallingford,Conn. W2	5.85	6.75	7.35	9.30	11.60
Weirton,W.Va. W6	5.35	6.80	7.40	9.35	11.65
Worcester,Mass. A7	4.95	6.75	7.70	9.65	11.90
Worcester,Mass. T6	5.50	6.75	7.70	9.65	11.90
Youngstown C8	...	6.80	7.40	9.35	11.65
Spring Steel (Tempered)					
Trenton,N.J. R5	...	...	10.30	12.50	15.30
Harrison,N.J. C18	...	...	10.30	12.50	15.30
NewYork W3	...	...	10.30	12.50	15.30

STRIP, Cold-Rolled Carbon

Anderson,Ind.(40) G6	5.50
Berea,O. C7	6.65
Bridgeprt,Conn.(10) S15	5.25
Butler,Pa. A10	4.65
Cleveland A7, J5	4.65
Dearborn,Mich. D3	5.60
Detroit D2	5.60
Detroit M1	5.45
Dover,O.(40) G6	5.50
Ecorse,Mich. G5	4.30
Follansbee,W.Va. F4	5.35
Fontana,Calif. K1	6.30
FranklinPark,Ill.(40)T6	4.80
Ind.Harbor,Ind. I-2	4.50
Lackawanna,N.Y. B2	4.65
LosAngeles C1	6.40
Mattapan,Mass. T6	5.50
Middletown,O. A10	4.65
NewBritain(10) S15	5.25
NewCastle,Pa. B4	5.35
NewCastle(40) E5	5.25
NewHaven,Conn. D2	5.85
NewHaven,Conn. A7	5.15
Pawtucket,R.I. R3	6.00
Pawtucket,R.I.(21) N8	5.85
Riverdale,Ill.(40) A1	4.90
Rome,N.Y. R6	5.10
Sharon,Pa. S3	5.35
SparrowsPoint,Md. B2	4.65
Trenton,N.J. R5	6.00
Wallingford,Conn. W2	5.85
Warren,O. R2	4.85
Weirton,W.Va. W6	4.65
WestLeechburg,Pa. A4	4.65
Youngstown C8, (40)	5.25
Youngstown Y1	4.65

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2	5.25

STRIP, Electro Galvanized

Cleveland A7	4.85
Dover,O. G6	5.50
Warren,O. T5	5.25
Weirton,W.Va. W6	4.85
Youngstown C8	5.25

TIGHT COOPERAGE HOOP

Atlanta A11	4.05
Riverdale,Ill. A1	3.90
Sharon,Pa. S3	4.15
Youngstown U5	3.75

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$7.15	$7.40	$7.80
Fairfield,Ala. T2	7.25	7.50	7.90
Gary,Ind. U5	7.15	7.40	7.80
GraniteCity,Ill. G4	7.35	7.60	8.00
Ind.Harbor,Ind. I-2, Y1	7.15	7.40	7.80
Irvin,Pa. U5	7.15	7.40	7.80
Niles,O. R2	7.15	7.40	7.80
Pittsburg,Calif. C11	7.90	8.15	8.40
SparrowsPoint,Md. B2	7.25	7.50	7.75
Weirton,W.Va. W6	7.15	7.40	7.80
Yorkville,O. W10	7.15	7.40	7.80

SHEETS, SILICON, H.R. or C.R.(22 Ga.) COILS (Cut Lengths ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom W10 (cut lengths)	...	...	7.25	8.50	9.30
Brackenridge,Pa. A4	...	...	7.75	9.00	9.80
GraniteCity,Ill.G4 (cut lengths)	...	...	7.95	9.20	...
Ind.Harbor,Ind. I-2	6.95	7.25	(34)	...	...
Mansfield,O. E6 (cut lengths)	7.10	7.25	7.75	9.00	9.80
Niles,O. N12 (cut lengths)	...	6.75	7.25	...	...
Vandergrift,Pa. U5	...	7.25	7.75	9.00	9.80
Warren,O. R2	6.95	7.25	7.75	9.00	9.80
Zanesville,O. A10	...	7.25	7.75	9.00	9.80

SHEETS, SILICON (22 Ga. Base) Coils (Cut Lengths ½c lower)

Transformer Grade	72	65	58	52
BeechBottom W10 (cut lengths)	9.85	10.40	11.10	11.90
Brackenridge,Pa. A4	10.35	....	....	....
Vandergrift,Pa. U5	10.35	10.90	11.60	12.40
Warren,O. R2	10.35	....	....	....
Zanesville,O. A10	10.35	10.90	11.60	12.40

H.R. or C.R. COILS AND CUT LENGTHS, SILICON (22 Ga.)	T-100	T-90	T-80	T-73
Butler,Pa. A10 (C.R.)	....	....	14.75	15.25
Vandergrift,Pa. U5	12.90	13.75	14.75	15.25

Key to Producing Companies

A1 Acme Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A7 American Steel & Wire
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A13 American Cladmetals Co.
B1 Babcock & Wilcox Tube
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B6 Bolardi Steel Corp.
B8 Braeburn Alloy Steel
B11 Buffalo Bolt Co.
B12 Buffalo Steel Co.
B14 A. M. Byers Co.
C1 Calif. Cold Rolled Steel
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C5 Central Iron & Steel Div. Barium Steel Corp.
C7 Cleve.Cold.Roll.Mills Co.
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia Steel Co.
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
D2 Detroit Steel Corp.
D3 Detroit Tube & Steel
D4 Disston & Sons, Henry
D6 Driver Harris Co.
D7 Dickson Weatherproof Nail Co.
E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.
F2 Firth Sterling Steel
F3 Fitzsimons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
G1 Geneva Steel Co.
G2 Globe Iron Co.
G3 Globe Steel Tubes Co.
G4 Granite City Steel Co
G5 Great Lakes Steel Corp
G6 Greer Steel Co.
H1 Hanna Furnace Corp.
H4 Heppenstall Co.
I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
J1 Jackson Iron & Steel Co
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.
K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Electric Steel
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

Manufacturers Bright, Carbon

aCity,Ala. R2 ...4.85
oa,Pa. J5 .....4.85
A11 .....5.10
l.(1) L1 .....4.50
ville.Ill.(1) K4 ..4.85
W12 .....4.85
W13 .....4.85
nd A7 .....4.85
nd C20 .....4.55
rdsville,Ind. M8..5.10
,Pa. A7 .....4.85
A7 .....4.85
d,Ala. T2 .....4.85
O.(24) S1 .....*5.35*
n S5 .....5.25
nown,Pa. B2 .....4.85
ll. A7 .....4.85
City,Mo. S5 ...5.45
o,Ind. C16 .....4.95
steles B3 .....5.80
ua,Colo. C10 ....5.10
een,Pa. P7 .....5.10
x, 6-8ga. I-1 ....5.50
onawanda B11 ...4.85
,Mass. W12 .....5.15
rg,Calif. C11 ....5.80
louth,O. P12 .....5.25
a,Pa. A7 .....4.85
ago,Ill. R2 .....4.85
Francisco C10 ...5.80
wsPoint,Md. B2 ..4.95
g,Ill.(1) N15 ....4.85
ers,O. Y1 .....4.85
ce,Calif. C11 ....5.80
gan,Ill. A7 .....4.85
ster,Mass. A7, T6..5.15

Cold-Rolled Flat

son,Ind. G6 .....6.20
W12 .....6.35
A7 .....5.85
ordsville,Ind. M8..6.20
D2 .....6.20
O. G6 .....6.20
ia,O. S1 .....6.00
o,Ind. C16 .....5.70
linPark,Ill. T6 ...6.20
dion, O. R8 .....5.85
nsen,Pa. P16 .....5.85
nsen,Pa. P7 .....6.10
aven,Conn. D2 ...6.50
cket,R.I.(12) N8..6.85
n,N.J. R5 .....6.15
ster T6 .....6.50
ster W12 .....6.65
ster A7 .....6.00

Galv'd ACSR for Cores

nville,Ill. K4 .....8.50
nsen,Pa. P16 .....8.50
ng,N.J. R5 .....8.80
owsPoint,Md. B2 ..8.25

WIRE	Mild Plow	Plow	Imp. Plow
nville,Ill. K4	8.55	8.55	8.80
o W12	8.55	8.55	8.80
and A7	8.55	8.55	8.80
a,Pa. A7	8.55	8.55	8.80
a,O. S1	*8.85*	*8.85*	*9.10*
town,Pa. B2	8.05	8.05	8.30
sen,Pa. P16	8.55	8.55	8.80
sen,Pa. P7	8.80	8.80	9.05
aven,Conn. A7	8.85	8.85	9.10
er,Mass. W12	8.85	8.85	9.10
mouth,O. P12	8.55	8.55	8.80
ing,N.J. R5	8.85	8.85	9.10
owsPoint,Md. B2	8.15	8.15	8.40
ers,O. Y1	8.55	8.55	8.80
on,N.J. A7	8.85	8.85	9.10
egan,Ill. A7	8.55	8.55	8.80
msport,Pa. B2	8.15	8.15	8.40
ster,Mass. J4	8.35	8.35	8.60
ster,Mass. T6	8.85	8.85	9.10

WIRE, Merchant Quality

(6 to 8 gage)	An'ld.	Galv.
AlabamaCity R2	5.70	5.95
Aliquippa J5	5.70	6.15
Atlanta A11	5.95	6.40
Bartonville(19)K4	5.95	6.15
Buffalo W12	4.85	...
Cleveland A7	5.70	6.15
Crawfordsville M8	5.95	6.40
Donora A7	5.70	6.15
Duluth A7	5.70	6.15
Fairfield T2	5.70	6.15
Houston,Tex. S5	6.10	6.55
Johnstown B2	5.70	6.15
Joliet,Ill. A7	5.70	6.15
KansasCy,Mo. S5	6.30	6.75
Kokomo C16	5.80	6.05
LosAngeles B3	6.65	...
Minnequa C10	5.95	6.45
Monessen P7	5.95	6.40
Palmer W12	5.15	...
Pitts.Calif. C11	6.65	6.80
Prtsmth.(18)P12	6.10	6.60
Rankin A7	5.70	6.15
So.Chicago R2	5.70	5.95
So.S.Fran. C10	6.65	7.10
SparrowsPt. B2	5.80	6.25
Sterling,Ill.(1)N15	5.70	6.15
Struthers,O. Y1	5.70	6.15
Torrance,Cal. C11	6.65	...
Worcester A7	6.00	6.45

WIRE (16 gage)

	An'ld Stone	Galv. Stone
Aliquippa J5	10.15	11.85
Bartonville(1) K4	10.25	11.95
Cleveland A7	10.25	12.15
Crawfrdsvle M.8	10.30	12.00
Fostoria,O. S1	10.40	13.00
Johnstown B2	10.15	12.05
Kokomo C16	10.25	11.95
Minnequa C10	10.40	12.40
Palmer,Mass.W12	10.25	12.15
Pitts.,Cal. C11	10.25	12.15
Prtsmth.(18) P12	10.55	12.30
SparrowsPt. B2	10.25	12.15
Waukegan A7	10.25	12.15

WIRE, Fine and Weaving (8-in. Coils)

Bartonville,Ill.(1) K4	8.90
Buffalo W12	8.90
Chicago W13	8.90
Cleveland A7	8.90
Crawfordsville,Ind. M8	8.95
Fostoria,O. S1	8.90
Johnstown,Pa. B2	8.45
Kokomo,Ind. C16	8.90
Monessen,Pa. P16	8.90
Palmer,Mass. W12	9.20
Portsmouth,O. P12	8.90
Roebling,N.J. R5	9.20
Waukegan,Ill. A7	8.90
Worcester,Mass. A7, T6	9.20

WIRE, MB Spring, High Carbon

Aliquippa,Pa. J5	6.25
Alton,Ill.(1) L1	5.90
Bartonville,Ill.(1) K4	6.25
Buffalo W12	6.25
Cleveland A7	6.25
Donora,Pa. A7	6.25
Duluth A7	6.25
Fostoria,O. S1	*6.25*
Johnstown,Pa. B2	6.25
LosAngeles B3	7.20
Millbury,Mass.(12) N6	*8.05*
Monessen,Pa. P7, P16	6.25
Palmer,Mass. W12	6.55
Pittsburg,Calif. C11	7.20
Roebling,N.J. R5	6.55
Portsmouth,O. P12	6.25
So.Chicago,Ill. R2	6.25
So.SanFrancisco C10	6.85
SparrowsPoint,Md. B2	6.35
Struthers,O. Y1	6.25
Trenton,N.J. A7	6.55
Waukegan,Ill. A7	6.25
Worcester A7, J4, W12	6.55
Worcester,Mass. N6, T6	6.20

WIRE, Upholstery Spring

Aliquippa,Pa. J5	5.90
Alton,Ill.(1) L1	5.55
Buffalo W12	5.90
Cleveland A7	5.90
Donora,Pa. A7	5.90
Duluth A7	5.90
Johnstown,Pa. B2	5.90
LosAngeles B3	6.85
Monessen,Pa. P7, P16	5.90
NewHaven,Conn. A7	6.20
Palmer,Mass. W12	6.20
Pittsburg,Calif. C11	6.85
Portsmouth,O. P12	5.90
Roebling,N.J. R5	6.20
So.Chicago,Ill. R2	5.90
SparrowsPoint,Md. B2	6.00
Torrance,Calif. C11	6.85
Trenton,N.J. A7	6.20
Waukegan,Ill. A7	5.90
Worcester,Mass. A7	6.20

WIRE, Tire Bead

Bartonville,Ill.(1) K4	10.90
Monessen,Pa. P16	11.40
Roebling,N.J. R5	11.55

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	136
Aliquippa,Pa. J5	140
Atlanta A11	143
Bartonville,Ill.(19) K4	143
Crawfordsville M8	145
Donora,Pa. A7	140
Duluth,Minn. A7	140
Fairfield,Ala. T2	140
Houston,Tex. S5	148
Johnstown,Pa. B2	140
Joliet,Ill. A7	140
KansasCity,Mo. S5	152
Kokomo,Ind. C16	142
Minnequa,Colo. C10	146
Monessen,Pa. P7	145
Pittsburg,Calif. C11	160
Portsmouth,O.(18) P12	147
Rankin,Pa. A7	140
So.Chicago,Ill. R2	136
So.SanFran.,Calif. C10	160
SparrowsPoint,Md. B2	142
Sterling,Ill.(1) N15	140

FENCE POSTS

	Col.
ChicagoHts.,Ill. C2	140
Duluth A7	125
Franklin,Pa. F5	140
Huntington,W.Va. W7	130
Johnstown,Pa. B2	125
Joliet,Ill. A7	125
Marion,O. P11	140
Minnequa,Colo. C10	130
Moline,Ill. R2	136
So.Chicago R2	140
Tonawanda B12	140
Williamsport,Pa. S19	150

WOVEN FENCE, 9-15½ Ga. Col.

AlabamaCity,Ala. R2	126
Ala.City,Ala.,17-18ga.R2	213
Aliquippa,Pa.9-14½ga.J5	130
Atlanta A11	133
Bartonville,Ill.(19) K4	130
Crawfordsville,Ind. M8	132
Donora,Pa. A7	130
Duluth A7	130
Houston,Tex. S5	138
Fairfield,Ala. T2	130
Johnstown,Pa. B2	130
Johnstown,17ga.,6" B2	204
Johnstown,17ga.,4" B2	207
Joliet,Ill. A7	130
KansasCity,Mo. S5	142
Kokomo,Ind. C16	132
Minnequa,Colo. C10	138
Monessen,Pa. P7	135
Pittsburg,Calif. C11	153
Portsmouth,O.(18) P12	137
Rankin,Pa. A7	130
So.Chicago,Ill. R2	126
Sterling,Ill.(1) N15	130

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	123
Atlanta A11	126
Bartonville,Ill.(19) K4	123
Chicago W13	123
Crawfordsville M8	132
Donora,Pa. A7	123
Duluth A7	123
Fairfield,Ala. T2	123
Joliet,Ill. A7	123
KansasCity,Mo. S5	135
Kokomo,Ind. C16	125
Minnequa,Colo. C10	128
Pittsburg,Calif. C11	147
So.Chicago,Ill. R2	123
So.SanFran.,Calif. C10	147
SparrowsPoint,Md. B2	125
Sterling,Ill.(1) N15	123

AXLES

Ind Harbor,Ind. S13 ...5.60
Johnstown,Pa. B2 .....5.60

JOINT BARS

Bessemer,Pa. U5 .....4.70
Fairfield,Ala. T2 .....4.70
Ind.Harbor,Ind. I-2 ...4.70
Joliet,Ill. U5 .....4.70
Lackawanna,N.Y. B2 ...4.70
Minnequa,Colo. C10 ...4.70
Steelton,Pa. B2 .....4.70

TRACK BOLTS (20) Treated

KansasCity,Mo. S5 ....9.85
Lebanon,Pa.(32) B2 ...9.85
Minnequa,Colo. C10 ....9.85
Pittsburgh O3, P14 ...9.85
Seattle B3 .....10.10

NAILS & STAPLES, Stock to dealers & mfrs. (7)

	Col.
AlabamaCity,Ala. R2	118
Aliquippa,Pa.(13) J5	118
Atlanta A11	121
Bartonville,Ill.(19) K4	118
Chicago,Ill. W13	130
Cleveland A9	111
Crawfordsville,Ind. M8	122
Donora,Pa. A7	118
Duluth A7	118
Fairfield,Ala. T2	118
Galveston,Tex. D7	126
Houston,Tex. S5	126
Johnstown,Pa. B2	118
Joliet,Ill. A7	118
KansasCity,Mo. S5	130
Kokomo,Ind. C16	120
Minnequa,Colo. C10	123
Monessen,Pa. P7	124
Pittsburg,Calif. C11	137
Portsmouth,O. P12	124
Rankin,Pa. A7	118
So.Chicago,Ill. R2	118
SparrowsPoint,Md. B2	120
Sterling,Ill.(1) N15	118
Torrance,Calif. C11	138
Worcester,Mass. A7	124

NAILS & STAPLES, Non-Stock

AlabamaCity,Ala. R2 ..6.10
Bartonville,Ill.(19) K4 ..5.95
Crawfordsville,Ind. M8 .6.30
Donora,Pa. A7 .....5.95
Duluth A7 .....5.95
Johnstown,Pa. B2 .....5.95
Joliet,Ill. A7 .....5.95
Kokomo,Ind. C16 .....6.05
Minnequa,Colo. C10 ....6.20
Pittsburg,Calif. C11 ...6.90
Portsmouth,O. P12 .....6.25
Rankin,Pa. A7 .....5.95
So.Chicago,Ill. R2 .....6.10
SparrowsPoint,Md. B2 ..6.05
Sterling,Ill.(1) N15 ....5.65
Worcester,Mass. A7 ....6.25

NAILS, Cut (100 lb keg) To dealers (33)

Conshohocken,Pa. A3 ..$7.35
Wheeling,W.Va. W10 ...7.15

TIE PLATES

Fairfield,Ala. T2 .....4.50
Gary,Ind. U5 .....4.50
Ind.Harbor,Ind. I-2 ...4.50
Lackawanna,N.Y. B2 ...4.50
Minnequa,Colo. C10 ....4.50
Pittsburg,Calif. C11 ....4.65
Seattle B3 .....4.65
Steelton,Pa. B2 .....4.50
Torrance,Calif. C11 ....4.65

STANDARD TRACK SPIKES

Ind.Harbor,Ind. I-2, Y1.6.15
KansasCity,Mo. S5 ....6.40
Lebanon,Pa. B2 .....6.15
Minnequa,Colo. C10 ..6.15
Pittsburgh J5 .....6.15
Seattle B3 .....6.65
So.Chicago,Ill. R2 .....6.15
Struthers,O. Y1 .....6.15
Youngstown R2 .....6.15

RAILS	Std. No. 1	Std. No. 2	Std. All No. 2	TeeRails 60 lb Under
Bessemer,Pa. U5	3.60	3.50	3.55	4.00
Ensley,Ala. T2	3.60	3.50	...	4.00
Fairfield,Ala. T2	...	...	...	4.00
Gary,Ind. U5	3.60	3.50	3.55	...
Huntington,W.Va. W7	...	...	...	5.00
Ind.Harbor,Ind. I-2	3.60	3.50	3.55	...
Johnstown,Pa. B2	...	...	...(16)	4.00
Lackawanna B2	3.60	3.50	...	4.00
Minnequa,Colo. C10	3.60	3.50	...	4.50
Steelton,Pa. B2	3.60	3.50	...	...
Williamsport,Pa. S19	...	...	...	4.75

TOOL STEELS

Grade	Cents per lb	Grade	Cents per lb
Reg. Carbon	23.00	18W,4Cr,3V	140.00
Extra Carbon	27.00	18W,4Cr,2V,9Co	204.00
Spec. Carbon	32.50	19W,4Cr,2V,7Co	204.00
Oil Hardening	35.00	18.25W,4.25Cr,1V,4.75Co	172.00
Cr Hot Wrk	35.00	20.25W,4.25Cr,1.6V,12.25Co	323.00
Hi-Carbon-Cr	63.50	1.5W,4Cr,1V,8.5Mo	78.50
18W,4Cr,1V	110.00	6.4W,4.5Cr,1.9V,5Mo	84.00
18W,4Cr,2V	124.50	6W,4Cr,3V,6Mo	106.50

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, D4, F2, H4, J3, L3, M14, S8, T7, U4, V2, V3.

Key to Producing Companies

McLouth Steel Corp.	Detroit Steel Corp.	T3	Tenn. Prod. & Chem.
Mahoning Valley Steel	P13 Precision Drawn Steel	T4	Texas Steel Co.
Medart Co.	P14 Pitts.Screw & Bolt Co.	T5	Thomas Steel Co.
Mercer Tube & Mfg. Co.	P15 Pittsburgh Metallurgical	T6	Thompson Wire Co.
Mid-States Steel & Wire	P16 Page Steel & Wire Div., Amer. Chain & Cable	T7	Timken Roller Bearing
Midvale Co.		T9	Tonawanda Iron Div. Am. Rad. & Stan. San.
Missouri-Illinois Furnace	P17 Plymouth Steel Co.	U1	Ulster Iron Works
Moltrup Steel Products	R1 Reeves Steel & Mfg. Co.	U4	Universal Cyclops Steel
Monarch Steel Co.	R2 Republic Steel Corp.	U5	United States Steel Co.
McInnes Steel Co.	R3 Rhode Island Steel Corp.	V2	Vanadium Alloys Steel
National Supply Co.	R5 Roebling's Sons, John A.	V3	Vulcan Crucible Steel Co.
National Tube Co.	R6 Rome Strip Steel Co.	W1	Wallace Barnes Co.
Nelsen Steel & Wire Co.	R7 Rotary Electric Steel Co.	W2	Wallingford Steel Co.
NewEng.HighCarb.Wire	R8 RelianceDiv.,EatonMfg.	W3	Washburn Wire Corp.
Newman-Crosby Steel	S1 Seneca Wire & Mfg. Co.	W4	Washington Steel Corp.
Niles Rolling Mill Co.	S3 Sharon Steel Corp.	W6	Weirton Steel Co.
Northwst. Steel Roll. Mills	S5 Sheffield Steel Corp.	W7	W. Va. Steel & Mfg. Co.
Northwestern S.&W. Co.	S6 Shenango Furnace Co.	W8	West.Auto.Mach.Screw
New Delphos Mfg. Co.	S7 Simmons Co.	W9	Wheatland Tube Co.
Oliver Iron & Steel Corp.	S8 Simonds Saw & Steel Co.	W10	Wheeling Steel Corp.
Oregon Steel Mills	S9 Sloss-Sheffield,S.&I. Co.	W12	Wickwire Spencer Steel Div., Colo. Fuel & Iron
Pacific States Steel Corp.	S13 Standard Forgings Corp.	W13	Wilson Steel & Wire Co.
Pacific Tube Co.	S14 Standard Tube Co.	W14	Wisconsin Steel Div. International Harvester
Phoenix Iron & Steel Co.	S15 Stanley Works	W15	Woodward Iron Co.
Pilgrim Drawn Steel	S16 Struthers Iron & Steel	W16	Worth Steel Co.
Pittsburgh Coke&Chem.	S17 Superior Drawn Steel Co.	W18	Wyckoff Steel Co.
Pittsburgh Steel Co.	S18 Superior Steel Corp.	Y1	Youngstown Sheet&Tube
Pittsburgh Tube Co.	S19 Sweet's Steel Co.		
Pollak Steel Co.	S20 Southern States Steel		
Portsmouth Division,	T2 Tenn. Coal, Iron & R.R.		

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant. (4) Reinforcing.
(5) Philadelphia del.
(6) Chicago or Birm. base.
(7) To jobbers, 3 cols. lower.
(8) 16 gage and heavier.
(9) 6 in. and narrower.
(10) Pittsburgh base.
(11) Cleveland & Pittsburgh base.
(12) Worcester, Mass. base.
(13) Add 0.50c for 17 Ga & heavier.
(14) Also wide flange beams.
(15) ¼" and thinner.
(16) 40 lb and under.
(17) Flats only.
(18) To dealers.
(19) Chicago & Pittsburgh base.
(20) Deduct 0.25c for untreated.
(21) New Haven, Conn. base.
(22) Del. San Fran. Bay area.
(23) 28 Ga. 36" wide.
(24) Deduct 0.20c, finer than 15 Ga.
(25) Bar mill bands.
(26) Reinforcing, to fabricators (⅜" bar elec. furn. billet, 5.03c); to consumers, 5.28c.
(27) Bar mill sizes.
(28) Bonderized.
(29) Subject to 10% increase.
(30) Sheared; add 0.35c for universal mill.
(31) Not annealed.
(32) Rd. edge or square edge.
(33) To jobbers, deduct 20 cents.
(34) 7.25c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) 15 gage & lighter; 60" & narrower.
(38) 14 gage & lighter; 48" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.

STANDARD PIPE, T. & C.

BUTTWELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % —Black— A	B	C	—Galvanized— D	E	F
⅛	5.5c	0.24	34.0	32.0	29.0	1.5	+0.5	0.5
¼	6.0	0.42	28.5	26.5	26.0	+1.0	+3.0	0.5
⅜	6.0	0.57	23.5	21.5	21.5	+7.0	+9.0	4.0
½	8.5	0.85	36.0	34.0	35.0	14.0	12.0	13.0
¾	11.5	1.13	39.0	37.0	38.0	18.0	16.0	17.0
1	17.0	1.68	41.5	39.5	40.5	21.5	19.5	20.5
1¼	23.0	2.28	42.0	44.0	41.0	22.0	24.0	21.0
1½	27.5	2.78	42.5	41.5	41.5	23.0	21.5	22.0
2	37	3.68	43.0	41.0	42.0	23.5	21.5	22.5
2½	58.5	5.82	43.5	41.5	42.5	24.0	22.0	23.0
3	76.5	7.62	43.5	41.5	42.5	24.0	22.0	23.0

Column A: Etna, Pa. N2; Butler, Pa. ⅛-⅜", F6; Benwood, W. Va., 3½ points lower on ⅛", 1½ points lower on ¼", and 2 points lower on ⅜", W10; Sharon, Pa. M6, 1 point higher on ⅛", 2 points lower on ¼" and ⅜"; following make ½" and larger: Lorain, O., N3; Youngstown R2 and 36½% on 3½" and 4"; Youngstown Y1; Aliquippa, Pa. J5. Fontana, Calif. K1 quotes 11½ points lower on ½" and larger continuous weld and 24% on 3½" and 4".

Columns B & E: Sparrows Point, Md. B2.

Columns C & F: Indiana Harbor, Ind., ½" through 3", Y1; Alton, Ill. (Lorain base) L1.

Column D: Butler, Pa. F6, ⅛-⅜"; Benwood, W. Va. W10, except plus 3½% on ⅛", plus 2½% on ¼", plus 9% on ⅜"; Sharon, Pa. M6, plus 0.5 on ⅛", 1 point lower on ½", ¾", 1½ points lower on 1" and 1¼", 2 points lower on 1½", 2", 2½" and 3". Following quote only on ½" and larger: Lorain, O. N3; Youngstown R2, and 16½% on 3½" and 4"; Youngstown Y1; Aliquippa, Pa. J5 quotes 1 point lower on ¾", 2 points lower on 1", 1½ points lower on 1¼", 2 points lower on 1½" and 2", 1½ points lower on 2½" and 3"; Etna, Pa. N2 and 18½% on 3½" and 4".

SEAMLESS AND ELECTRIC WELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % Seamless Black A	Seamless Galv. B	Elec. Weld Black C	Elec. Weld Galv. D
2	37.0c	3.68	29.5	9.5	29.5	9.5
2½	58.5	5.82	32.5	12.5	32.5	12.5
3	76.5	7.62	32.5	12.5	32.5	12.5
3½	92.0	9.20	34.5	14.5	34.5	14.5
4	$1.09	10.89	34.5	14.5	34.5	14.5
5	1.48	14.81	37.0	17.0	37.0	17.0
6	1.92	19.18	37.0	17.0	37.0	17.0

Column A: Aliquippa J5; Ambridge N2; Lorain N3; Youngstown Y1.

Column B: Aliquippa J5 quotes 1½ pts lower on 2", 1 pt lower on 2½-6 in.; Lorain, N3; Youngstown Y1.

Columns C & D: Youngstown R2.

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft. inclusive.

O.D. In.	B.W Ga.	—Seamless— H.R.	C.D.	Elec. Weld H.R.	C.D.
1	13	13.45	16.47	15.36	15.36
1¼	13	16.09	19.71	15.61	18.19
1½	13	17.27	21.15	17.25	20.30
1⅞	13	19.29	23.62	19.62	23.09
2	13	21.62	26.48	21.99	25.86
2¼	13	24.35	29.82	24.50	28.84
2¼	12	26.92	32.97	26.98	31.76
2½	12	29.65	36.32	29.57	34.76
2¾	12	32.11	39.33	31.33	36.84
3	12	34.00	41.64	32.89	38.70

CLAD STEELS

(Cents per pound)

Cladding Stainless	—Plates— Carbon Base 10%	Carbon Base 20%	—Strip— Cold-Rolled Carbon Base Both Sides	—Sheets— Carbon Base 10%	Carbon Base 20%	Cu Base Both Sides
302	....	....	....	19.75	27.50	77.00
304	25.00	28.00–29.50	....	20.75–24.50	27.50	77.00
309	30.50	35.00	....	....	....	....
310	36.50	41.00	....	....	....	144.00
316	29.50	31.50–34.00	....	26.00	36.50	....
317	34.50	39.00	....	....	....	....
318	33.50	38.00	....	....	....	....
321	26.50	31.00	....	23.00	33.00	111.00
347	27.50	30.50–32.00	....	24.00	33.50	130.00
405	21.25	27.75	....	....	....	....
410	20.75	27.25	....	....	....	....
Nickel	33.25	44.25	41.00	54.00	....	....
Inconel	41.00	53.50	....	....	....	165.00
Monel	34.75	45.75	....	....	....	....
Copper*	....	....	23.70†	29.65‡	....	....

* Deoxidized. † 20.20c for hot-rolled. ‡ 26.40c for hot-rolled. Production points for carbon base products: Stainless plates, sheet, Conshohocken, Pa. A3 and New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. W16, Coatesville, Pa. L7 and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; nickel, monel, copper-clad strip, Carnegie, Pa., S18. Production point for copper-base sheets is Carnegie, Pa. A13.

BOLTS, NUTS

CARRIAGE, MACHINE BOLTS

(F.o.b. midwestern plants; per cent off list for less than case lots to consumers)

6 in. and shorter:
- ½-in. & smaller diam. 15
- ⅝-in. & ⅝-in. 18.5
- ¾-in. and larger..... 17.5

Longer than 6 in.:
- All diams. 14

Lag bolts, all diams.:
- 6 in. and shorter 23
- over 6 in. long 21

Ribbed Necked Carriage 26

Blank 34

Plow 34

Step, Elevator, Tap, and Sleigh Shoe 21

Tire bolts 12

Boiler & Fitting-Up bolts 31

NUTS

	Reg.	Heavy
H.P. & C.P. Square:		
½-in. & smaller	15	15
⅝-in. & ⅝-in. .	12	6.5
¾-in.-1½-in. ..	9	1
1⅛ in. & larger	7.5	1
H.R. Hex.:		
½-in. & smaller	26	22
⅝-in. & ⅝-in.	16.5	6.5
¾-in.-1½-in. ..	12	2
1⅛ in. & larger	8.5	2
C.P. Hex.:		
½-in. & smaller	26	22
⅝-in. & ⅝-in..	23	17.5
¾-in. & 1½-in.	19.5	12
1⅛-in. & larger	12	6.5

SEMIFINISHED NUTS

American Standard

(Per cent off list for less than case or keg quantities)

	Hvy.	Reg.
½-in. & smaller....	35	28.5
⅝-in. & ⅝-in. ...	29.5	22
¾-in.-1½-in.	24	15
1⅛-in. & larger....	13	8.5
Light ⅞-in. & smaller	35	
½-in. to ⅝-in.	28.5	
¾-in. to 1½-in.	26	

STEEL STOVE BOLTS

(F.o.b. plant; per cent off list in packages)

Plain finish .....56 & 10

Plated finishes.....41 & 10

HEXAGON CAP SCREWS

(1020 steel; packaged; per cent off list)

6 in. or shorter:
- ⅝-in. & smaller 47
- ¾-in. through 1 in. ... 40

Longer than 6 in.:
- ⅝-in. & smaller 33
- ¾-in. through 1 in. ... 18

SQUARE HEAD SET SCREWS

(Packaged; per cent off list)

1 in. diam. x 6 in. and shorter 44

1 in. and smaller diam. x over 6 in. 33

HEADLESS SET SCREWS

(Packaged; per cent off list)

No. 10 and smaller 41

¼-in. diam. & larger .. 24

N.F. thread, all diams... 18

RIVETS

F.o.b. midwestern plants

Structural ½-in., larger 7.85c

⅞-in. under ..... 36 off

WASHERS, WROUGHT

F.o.b. shipping point, to jobbers ....List to 50c off

ELECTRODES

(Threaded, with nipples, unboxed, f.o.b. plant)

GRAPHITE

—Inches— Diam.	Length	Cents per lb
17,18,20	60,72	17.00
8 to 16	48,60,72	17.00
7	48,60	18.64
6	48,60	19.95
4,5⅛	40	20.48
3	40	21.53
2½	24,30	22.05
2	24,30	24.15
CARBON		
40	100,110	7.65
35	100,110	7.65
30	84,110	7.65
24	72 to 104	7.65
17 to 20	34,90	7.65
14	60,72	8.16
10,12	60	8.42

STAINLESS STEEL

Type	Sheets	C.R. Strip	Bars Wire Structurals
301...	41.00	34.00	31.25
302...	41.00	36.50	31.25
303...	43.00	40.00	33.75
304...	43.00	38.50	32.75
309...	55.50	54.50	44.25
316...	56.50	58.50	48.75
321...	49.00	48.00	36.75
347...	53.50	52.00	41.25
410...	36.50	30.50	25.75
416...	37.00	37.00	26.25
420...	44.00	47.00	31.25
430...	39.00	31.00	26.25
501...	27.50	26.00	14.25
502...	28.50	27.00	15.25

Brackenridge, Pa., sheets A4.

Bridgeville, Pa., bars, wire, sheets & strip U4.

Butler, Pa., sheets and strip except Types 303, 309, 416, 420, 501 & 502 A10.

Carnegie, Pa., sheets and strip except Types 303, 416, 501 & 502, S18.

Cleveland, strip A7.

Dunkirk,N.Y., bars, wire A4.

Duquesne, Pa., bars U5.

Gary, Ind., sheets except Type 416 U5.

Harrison, N. J., strip C18.

McKeesport, Pa., bars, sheets except Type 416 U5.

McKeesport, Pa., bars & wire except Types 301, 309, 501 & 502; strip Types 410 & 430 only F2.

Middletown, O., sheets and strip except Types 303, 416, 420, 501 and 502 A10.

Midland, sheets & strip C18.

Munhall, Pa., bars U5.

Pittsburgh, sheets C18.

Sharon, Pa., strip, except Types 303, 309, 316, 416, 501 and 502 S3.

So. Chicago, Ill., bars & structurals U5.

Syracuse, N. Y., bars, wire & structurals C18.

Titusville, Pa., bars, U4.

Wallingford, Conn., strip, except 309, W2 quotes 0.25 cents higher.

Washington, Pa., bars, sheets & strip, except Type 309 sheets 56.00c and bars 44.75c, J3.

Washington, Pa., Types 301 through 347 sheets & strip as listed except 303 & 309; 316 sheets 61.50c, strip 63.00c, W4.

Watervliet, N. Y., structurals & bars A4.

Waukegan, bars & wire A7.

West Leechburg, Pa., strip, A4.

COAL CHEMICALS

Spot, cents per gallon, ovens

Pure benzol 30.00-35.00

Toluol, one deg...26.00-33.00

Industrial xylol ..25.00-33.50

Per ton bulk, ovens

Sulphate of ammonia..$32.-45

Cents per pound, ovens

Phenol, 40 (carlots, non-returnable drums) ..17.25

Do., less than carlots..18.00

Do., tank cars 15.50

FLUORSPAR

Metallurgical grade, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content, 70% or more, $41; less than 60%, $38.

Imported, net ton, duty paid, metallurgical grade, $28-$29.

METAL POWDERS

(Per pound, f.o.b. shipping point in ton lots for mm. 100 mesh, except as otherwise noted.)

Sponge Iron Cents
- 98+% Fe, carlots.. 16.00
- Swedish, c.l.f. New York, in bags ...7.40-8.50

Electrolytic Iron:
- Annealed, 99.5% Fe. 42.50
- Unannealed, 99+% Fe 36.50
- Unannealed, 99+% Fe(minus 325 mesh) 58.50

Powder Flakes 48.50

Carbonyl Iron:
- 97.9-99.8%, size 5 to 10 microns..83.00-148.00

Aluminum:
- Carlots, freight allowed 29.50
- Atomized, 500 lb drums, freight allowed 33.50

Brass, 10-ton lots 30.00-33.25

Copper:
- Electrolytic 37.50
- Reduced 33.75-37.00

Lead 25.50

Manganese:
- Minus 100-mesh 57.00
- Minus 35 mesh 52.00
- Minus 200 mesh 62.00

Nickel unannealed 83.00

Nickel-Silver, 10-ton lots 44.00

Silicon 38.50

Solder (plus cost of metal) 8.50

Stainless Steel, 302 ....$1.27

Tin $1.60

Zinc, 10-ton lots..23.00-30.50

Tungsten: Dollars
- 99%, minus 80 to 200 mesh, freight allowed: over 1000 lb 2.90
- 1000 lb 2.95
- Less than 1000 lb ... 3.00
- 98.8% minus 65 mesh, freight allowed: 1000 lb and over... 4.15
- less than 1000 lb... 4.25

Molybdenum:
- 99%, minus 80 to 200 mesh, over 500 lb 2.85
- 200 to 500 lb 3.10
- less than 200 lb ... 3.25

Chromium, electrolytic 99% Cr min. 3.50

METALLURGICAL COKE

Price per net ton

BEEHIVE OVENS

Connellsvil,fur. .$14.50-15.00

Connellsvil,fdry. .17.00-18.00

New River, foundry ...19.50

Wise county, foundry..15.95

Wise county, furnace..15.20

OVEN FOUNDRY COKE

Kearney, N. J., ovens..$22.75

Everett, Mass., ovens
- New England, del...‡24.80

Chicago, ovens 21.00
- Chicago, del. .....†22.45
- Detroit, del. 24.91

Terre Haute, ovens....22.50

Milwaukee, ovens 23.75

Indianapolis, ovens 22.75
- Chicago, del. 26.62
- Cincinnati, del. 25.67
- Detroit, del. 26.85

Ironton, O., ovens 21.50
- Cincinnati, del. 24.06

Painesville, O., ovens..24.00
- Buffalo, del. 26.12
- Cleveland, del. 25.72

Erie, Pa., ovens 23.50

Birmingham, ovens 20.30
- Birmingham, del. ...21.35

Philadelphia, ovens ...22.70

Nevilleisland,Pa.,ovens 23.00

Swedeland, Pa., ovens.22.00

St. Louis, ovens 24.25
- St. Louis, del. 25.38

Portsmouth, O., ovens.21.50
- Cincinnati, del. 24.06

Detroit, ovens 24.00
- Detroit, del. *25.00
- Buffalo, del. 27.04
- Flint, del. 26.44
- Pontiac, del. 25.39
- Saginaw, del. 26.75

Includes representative switching charge of: *, $1.00; †, $1.45, one-track charge being $1.20, two tracks $1.40, and three or more tracks $1.50. ‡ Or within $4.15 freight zone from works.

WAREHOUSE STEEL PRODUCTS

(Prices, cents per pound, for delivery within switching limits, subject to extras)

	SHEETS			STRIP		BARS			Standard Structural Shapes	PLATES	
	H.R. 18 Ga., Heavier*	C.R.	Gal. 10 Ga.†	H.R.*	C.R.*	H.R. Rds.	C.F. Rds.	H.R. Alloy 4140§		Carbon	Floor
York(city)	6.27	7.29	8.44	6.59	...	6.42	7.29	9.25	6.40	6.58	8.04
ork(c'try)	5.97	6.99	8.14	6.29	...	6.12	6.99	8.95	6.10	6.28	7.74
(city) ..	6.40	7.20	8.49	6.35	...	6.25	7.04	9.25	6.40	6.98	7.88
(c'try) .	6.20	7.00	8.29	6.15	...	6.05	6.84	9.05	6.20	6.78	7.68
(city) ..	7.15	7.05	8.25	6.35	...	6.30	7.11	8.90	6.15	6.30	7.40
(c'try) ..	6.90	6.80	8.00	6.10	...	6.05	6.86	8.65	5.90	6.05	7.15
(city) ...	5.80	7.04	8.27	6.24	...	6.24	7.09	...	6.34	6.00	7.64
(c'try) ..	5.60	6.84	8.07	6.04	...	6.04	6.89	...	6.14	5.80	7.44
k, Va. ..	6.50	...	...	6.70	...	6.55	7.70	...	6.60	6.50	8.00
mond, Va..	5.90	...	8.10	6.10	...	6.10	6.90	...	6.30	6.05	7.80
(w'hse) .	6.02	7.26	8.49	6.46	...	6.46	7.26	...	6.56	6.22	7.86
o (del.)..	5.80	6.60	8.29	6.06	...	5.80	6.65	10.65††[5]	6.00	6.25	7.55
o (w'hse)	5.60	6.40	8.09	5.86	...	5.60	6.45	10.45††[5]	5.80	6.05	7.35
(w'hse) .	5.60	6.40*	7.75	5.65-5.95	6.90	5.55	6.40	10.10††	5.70	5.75	7.00
t (w'hse).	5.45-5.78	6.53-6.80	7.99	5.94-5.95	7.75	5.84	6.56	8.91	6.09	6.19-6.35	7.28
and (del.)	5.80	6.60	8.30	5.89	7.10	5.77	6.60-6.70	8.91	10.02	6.12	7.32
(w'hse) .	5.60	6.40	8.10	5.69	6.90	5.57	6.40-6.50	8.71	5.82	5.92	7.12
. (city) ..	6.02	6.59	7.34	5.95	...	5.95	6.51	...	6.24	6.34	7.50
o (city) .	5.80	6.60	7.95	5.75	...	5.75	6.50	10.30	5.90	6.00	7.20
o (w'hse)	5.60	6.40	7.75	5.55	...	5.55	6.30	10.10	5.70	5.80	7.00
ukee (city)	5.94	6.74	8.09	5.89	...	5.89	6.74	10.44	6.04	6.14	7.34
u. (c'try)	5.74	6.54	7.89	5.69	...	5.69	6.54	10.24	5.84	5.94	7.14
uis (del.)	5.68	6.48	7.28	5.63	...	5.63	6.28	10.08††[5]	5.78	5.93	7.13
(w'hse).	5.48	6.28	7.08	5.43	...	5.43	6.08	9.88††[5]	5.58	5.73	6.93
City(city)	6.40	7.20	8.40	6.35	...	6.35	7.20	...	6.50	6.60	7.80
ity(w'hse)	6.20	7.00	8.20	6.15	...	6.15	7.00	...	6.30	6.40	7.60
a, Nebr...	6.13‡	...	8.33	6.13	...	6.18	6.98	...	6.18	6.38	7.83
ham(city) .	5.75	6.55	6.90[2]	5.70	...	5.70	7.53	...	5.85	6.10	8.25
ham(w'hse)	5.60	6.40	6.75[2]	5.55	...	5.55	7.53	...	5.70	5.95	8.23
ng. (city)	6.55	8.10	9.05[2]	6.60	8.90	6.55	7.75	...	6.55	6.60	9.20
(w'hse)..	6.35	7.90	8.85[2]	6.40	8.70	6.35	7.55	...	6.35	6.40	8.70
Francisco..	6.65	7.80*	8.65*	6.60	...	6.45	8.20	...	6.45	6.50	8.60
e-Tacoma.	7.05	8.60[2]	9.20	7.30	...	6.75	9.10	11.15	6.65	6.75	8.80

Prices do not include gage extras; † prices include gage and coating extras, except Birmingham (coating extra excluded) and Los Angeles (gage extra excluded); ‡ includes extra for 10 gage; § as rolled; †† as annealed. Base quantities, 2000 to 9999 lb except as noted: Cold-rolled strip, 2000 lb and over; cold-finished bars, 2000 lb and over; [2]—500 to 1499 lb; [3]—450 to 1499 lb; [5]—1000 to 1999 lb; [7]—300 to 999 lb; [9]—400 to 9999 lb.

REFRACTORIES

(Prices per 1000 bricks, f.o.b. plant)

FIRE CLAY BRICK

Duty: St. Louis, Vandalia, Farber, o, Mo., Olive Hill, Hayward, Ashland, Clearfield, Curwensville, Pa., Ottawa, Ill., 50. Hard-fired, St. Louis, Vandalia, Mo., Hill, Ky., $156.20.

Heat Duty: Salina, Pa. $99.60; Woode, N. J., St. Louis, Farber, Vandalia, o, Mo., West Decatur, Orviston, Clear- Beach Creek, Curwensville, Lumber, haven, Pa., Olive Hill, Hitchins, Halde- Ashland, Ky., Troup, Athens, Tex., ns Pottery, Ga., Bessemer, Ala., Portsh, Oak Hill, O., Ottawa, Ill.,$94.60.

mediate-Heat Duty: St. Louis, Farber, alia, Mo., West Decatur, Orviston, Beach k, Curwensville, Lumber, Lockhaven, St. s, Clearfield, Pa., Olive Hill, Hitchins, eman, Ashland, Hayward, Ky., Athens, p, Tex., Stevens Pottery, Ga., Portsh, O., Ottawa, Ill., $88; Bessemer, Ala., 0.

Heat Duty: Oak Hill, or Portsmouth, O., field, Orviston, Pa., $79.20; Parral, O., 0; St. Marys, Pa., $76; Ottawa, Ill., $70.

LADLE BRICK

Press: Chester, New Cumberland, W. Va., port, Merill Station, Clearfield, Pa., Iron- Wellsville, O., $66.

Cut: Chester, Wellsville, O., $64.

MALLEABLE BUNG BRICK

Louis, Vandalia, Farber, Mo., Olive Hill, $105.60; Beach Creek, Pa., $94.60; Otta- Ill., $90.

SILICA BRICK

Union, Claysburg, or Sproul, Pa., Portsth, O., Ensley, Ala., $94.60; Hays, Pa., .10; Joliet, Rockdale, Ill., E. Chicago, , $104.50; Lehi, Utah, Los Angeles, .10.

ern Silica Coke Oven Shapes (net ton): sburg, Mt. Union, Sproul, Pa., Birming- . $92.40.

ois Silica Coke Oven Shapes (net ton): t or Rockdale, Ill., E. Chicago, Ind., s, Pa., $93.50.

BASIC BRICK

net ton, Baltimore or Chester, Pa. Burned me brick, $73-$78; chemical-bonded chrome k, $77-$82; magnesite brick, $99-$104; nical-bonded magnesite, $88-$93.

MAGNESITE

net ton, Chewelah, Wash. Domestic deadned, ⅝" grains; bulk, $36.30; single paper s, $41.80.

DOLOMITE

net ton. Domestic, burned bulk; Bonne re, Mo., $12.15; Martin, Millersville, Narlo, y Center, Woodville, Gibsonburg, Bettsville, Billmeyer, Plymouth Meeting, Blue Bell, liams, Pa., Millville, W. Va., $13.

ORES

LAKE SUPERIOR IRON ORE

Gross ton, 51½% (natural), lower lake ports. After adjustment for analysis, prices will be increased or decreased as the case may be for increases or decreases after Dec. 2, 1950 in applicable lake vessel rates, upper lake rail freights, dock handling charges and taxes thereon.

Old range bessemer	$8.70
Old range nonbessemer	8.55
Mesabi bessemer	8.45
Mesabi nonbessemer	8.30
High phosphorus	8.30

EASTERN LOCAL ORE

Cents per unit, del. E. Pa.

Foundry and basic 56.62% concentrates contract	17.00

FOREIGN ORE

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60 to 68%:	
Spot	17.00
Long-term contract	15.00
North African hematites	15.75
Brazilian iron ore, 68-69%	18.00

TUNGSTEN ORE

Net ton unit, duty paid

Foreign wolframite and scheelite, per net ton unit	$38-$39
Domestic scheelite, del.	nominal

MANGANESE ORE

Long term contracts, nominal; nearby, 48%, duty paid, 79.8c-81.8c per long ton unit, c.i.f. U. S. ports; prices on lower grades adjusted to manganese content and impurities.

CHROME ORE

Gross ton, f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., or Tacoma, Wash.

Indian and African

48% 2.8:1	$32.50
48% 3:1	35.00-36.00
48% no ratio	26.00

South African Transvaal

44% no ratio	$19.50
45% no ratio	20.00
48% no ratio	27.00
50% no ratio	28.00-28.50

Brazilian

44% 2.5:1 lump	$32.00

Rhodesian

45% no ratio	$20.00-21.00
48% no ratio	26.00
48% 3:1 lump	35.00-36.00

Domestic—rail nearest seller

48% 3:1	$39.00

MOLYBDENUM

Sulphide concentrates per lb, molybdenum content, mines	$0.90

FERROALLOYS

MANGANESE ALLOYS

Spiegeleisen: (19-21% Mn, 1-3% Si). Carlot per gross ton, $70, Palmerton, Pa.; $71, Pittsburgh and Chicago; (16% to 19% Mn) $1 per ton lower.

Standard Ferromanganese: (Mn 78-82%, C 7% approx.) Carload, lump, bulk $185 per gross ton of alloy, c.l., packed, $197; gross ton lots, packed, $212; less gross ton lots, packed, $229; f.o.b. Alloy, W. Va., Niagara Falls, N. Y., Welland, Ont., or Ashtabula, O. Base price: $187, Johnstown, Pa.; $185, Sheridan, Pa.; $188, Etna, Pa.; $190, Chattanooga, Tenn. Shipment from Pacific Coast warehouses by one seller add $33 to above prices, f.o.b. Los Angeles, Oakland, Portland, Oreg. Shipment from Chicago warehouse, ton lots $227; less gross ton lots, $244 f.o.b. Chicago. Add or subtract $2.15 for each 1% or fraction thereof, of contained manganese over 82% and under 78%, respectively.

Low-Carbon Ferromanganese, Regular Grade: (Mn 85-90%). Carload, lump, bulk, max. 0.07% C, 25.75c per lb of contained Mn, carload packed 26.5c, ton lot 27.6c, less ton 28.8c. Delivered. Deduct 0.5c for max. 0.15% C grade from above prices, 1c for max. 0.30% C, 1.5c for max. 0.50% C, and 4.5c for max. 75% C—max, 7% Si. **Special Grade:** (Mn 90% min., C 0.07% max., P 0.06% max.). Add 0.5c to above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.5% max.). Carload, lump, bulk 19.15c per lb of contained Mn, carload packed 19.9c, ton lot 21.0c, less ton 22.2c. Delivered. Spot, add 0.25c.

Manganese Metal, 2" x D (Mn 96% min., Fe 2% max., Si 1% max., C 0.2% max.): Carload lump bulk, 29c per lb of metal; packed, 29.75c; ton lot 31.25c; less ton lot 33.25c. Delivered. Spot, add 2c.

Manganese, Electrolytic: 250 lb to 1999 lb, 32c; 2000 to 39,999 lb, 30c; 40,000 lb or more, 28c. Premium for hydrogen-removed metal 1.5c per pound, f.o.b. cars Knoxville, Tenn. Freight allowed to St. Louis or to any point east of Mississippi.

Silicomanganese: (Mn 65-68%). Contract, lump bulk, 1.50% C grade, 18-20% Si 9.90c per lb of alloy, carload packed, 10.65c, ton lot 11.55c, less ton 12.55c. Freight allowed. For 2% C grade, Si 15-17%, deduct 0.2c from above prices. For 3% C grade, Si 12-14.5%, deduct 0.5c from above prices. Spot, add 0.25c.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l., lump, bulk 21.75c per lb of contained Cr, c.l., packed 22.65c, ton lot 23.80c, less ton 25.20c. Delivered. Spot, add 0.25c.

"SM" High-Carbon Ferrochrome: (Cr 60-65%,

(*Please turn to page* 108)

Control Over Metals Tightens

Government is forced to extend restrictions on civilian use of nonferrous metals as military and stockpiling needs continue to expand. Consumers seek substitutes

New York—Restrictions on distribution and use of nonferrous metals are snowballing. As war production needs expand and purchases by the government for stockpiling increase, supplies available for civilian uses are shrinking rapidly.

At the final session of the 81st Congress, a $20 billion defense appropriation bill was passed, including nearly $1.9 billion for stockpiling strategic materials. This action was taken in the face of strong opposition by many metal producers who believe present consuming needs are more urgent than accumulation of reserves.

Frank L. Valenta, president, Natural Resources Fund Inc., this city, had urged a "stockpiling holiday for copper and zinc" for six months. He said the present stockpile of copper amounts to about 400,000 tons and that the 1951 program calls for storing of between 300,000 and 500,000 additional tons, or from 15 to 25 per cent of the world output.

Mr. Valenta declared the government's stockpile of zinc already has reached between 500,000 and 600,000 tons, or more zinc than was consumed in direct war effort in any single year of the 1942-1945 war period. The 1951 program calls for storing another 200,000 tons, almost 20 per cent of the amount of zinc currently used in the United States.

A copper fabricator, urging adoption of a "sensible" stockpiling policy, pointed out that "although we started the last war without a stockpile, there was never a shortage of copper for military needs."

Excessive accumulation of any mineral listed by Defense Minerals Administration, Interior Department, as being scarce is unlawful. The list covers more than 50 minerals.

Copper — National Production Authority banned the use of copper, effective Mar. 1, in more than 300 civilian products. The order prohibits copper from being used except when it serves a functional purpose and where no practical substitute is available. Articles in which no form of copper may be used fall in these categories: Builders' hardware, building materials, burial equipment, clothing and dress equipment, furnishings, furniture and fixtures, miscellaneous hardware, household electrical appliances, jewelry and novelties, motor vehicle trim, passenger transportation equipment and a host of miscellaneous items.

Stocks of refined copper held by fabricators fell to a postwar low in November, but use of the metal and new orders booked in that month were high. Brass mills, wire mills and foundries during November shipped products containing 128,790 tons of new refined copper compared with 128,202 tons of the metal used in products shipped in October. Tonnages of copper consumed in both months would have been much larger had the metal been available. Because the amount of copper received by manufacturers of copper goods fell short of the amount consumed, their supplies on hand were reduced 14,973 tons to 277,590 tons at the end of November. This was the smallest supply of refined copper held since early in World War II.

Lead—Many producers of civilian goods who have been unable to obtain sufficient tonnages of copper, zinc, tin, aluminum and other scarce metals to cover their needs are seeking large tonnages of lead for use as a substitute. Supplies of lead are becoming increasingly tight and are being allocated by producers, assigning top priority to national defense requirements. In addition to this sharp increase in domestic demand, inquiry on the export market is sharply higher.

STEEL'S Metal Price Averages for Dec., 1950

(Cents per pound)

Electrolytic Copper, del. Conn.	24.50
Lead, St. Louis	16.80
Prime, Western Zinc, E. St. Louis	17.50
Straits Tin, New York	144.74
Primary Aluminum ingots, del.	19.00
Antimony, f.o.b. Laredo, Tex.	32.00
Nickel, f.o.b. refinery	49.40
Silver, New York	80.00

Brass, Bronze Ingots—Wider uses of lead compositions in brass alloys are expected. Cutbacks in quantities of tin announced by NPA hit some brass ingot refiners with restrictions based upon a low period of bronze ingot production. Wherever possible, lead-content brasses will be substituted for bronzes. A leading maker of brass and bronze ingots reduced prices up to 2 cents a pound.

Use of Cadmium Restricted

Washington — National Production Authority limited the use of cadmium to a list of essential military and civilian products, effective as of Jan. 1. The order contains several broad provisions which might allow use of cadmium in some items not specifically on the permitted list. For instance, use of the metal is allowed on moving parts which cannot use a substitute. Although most nuts, bolts and screws are barred using cadmium plating, another broad provision says that "threaded fittings" of grey and malleable iron can use cadmium if no other finish will provide "required corrosion protection and tolerance." The order limits inventories of cadmium to a 30-da supply.

Cobalt Allocations Ordered

Washington — Every purchase o more than 25 pounds of cobalt, in cluding defense orders, will requir approval of National Production Au thority beginning Feb. 1. In Janu ary, civilian users are allowed up t one-third the amount of cobalt the used in January, 1950. Order M-1 as amended, places the metal unde virtually complete allocation, pro hibits certain uses and limits inven tories.

Nickel Product Prices Drop

New York—Prices established b International Nickel Co. Inc., thi city, on Dec. 13 for mill product produced in the United States hav been rolled back by amounts rangin from ½-cent to 5 cents per poun The reductions for regular mon products in sheet and rod forms a 1 cent and for all forms of simila rolled pure nickel products 2.50 cent per pound. The revised products a retroactive to Dec. 13. This actio was taken to comply with the na tion-wide voluntary price freeze re quested by Economic Stabilizatio Agency on Dec. 18.

On Dec. 13, International Nicke Co. of Canada raised the price of pr mary nickel sold in Canada or ex ported to other world markets b 2.50 cents per pound. The price ris remains unchanged.

Aluminum Output Climbing

Louisville — Aluminum productio will climb in 1951 to over 1.6 billio pounds, within 10 per cent of th peak year during World War I Richard S. Reynolds Jr., presiden Reynolds Metals Co., this city, pre dicts. Primary aluminum output ha increased so sharply during recen years that the 1951 production wi be double that in 1946. Further ex pansion of capacity, already agree upon, will enable the three leadin producers to achieve a rate of 2 billion pounds a year in 1952, a 5 per cent jump over 1950.

Special care must be exercised i making the shift from civilian t military production, Mr. Reynold warned, to avert the loss of skille manpower at key aluminum fabricat ing mills. A sudden stoppage of civ ilian operations at these mills, be fore there is any indication of wha military orders will fill the gap, ca only lead to shutdowns and unem ployment.

Aluminum Restrictions Eased

Washington—NPA eased for th second time its order cutting bac civilian consumption of aluminum Makers of "strictly functional" c moving parts can use during Marc 75 per cent of the aluminum the used for that purpose during an av erage month in the first half of 195 This action was needed to maintai production and permit additiona time for finding substitutes.

NONFERROUS METALS

(Cents per pound, carlots, except as otherwise noted)

ry Metals

Electrolytic 24.50c, Conn. Valley; .62½c, delivered.
Ingots: 85-5-5-5 (No. 115) 29.00c; (No. 215) 43.25c; 80-10-10 (No. 305) No. 1 yellow (No. 405) 25.50c.
Prime western 17.50c; brass special intermediate 18.00c, East St. Louis; ade 18.60c, delivered.
Common 16.80c; chemical 16.90c; cor- 16.90c, St. Louis.
Aluminum: 99% plus, ingots 19.00c, .00c. Base prices for 10,000 lb and Freight allowed on 500 lb or more but excess of rate applicable on 30,000 lb ers.
Aluminum: Piston alloys 31.00- No. 12 foundry alloy (No. 2 grade) 1.00c; steel deoxidizing grades, notch granulated or shot: Grade 1, 32.50- grade 2, 30.75-31.50c; grade 3, 30.00- grade 4, 29.50-30.00c. Prices include af c.l. rate up to 75 cents per 100 lb.
lum: Commercially pure (99.8%) stand- ots, 10,000 lb and over 24.50c, f.o.b. t, Tex.
rade A, spot, prompt, 157.00c; Jan. Feb. 155.00c; Mar. 154.00c; Apr.
ny: American 99-99.8% and over but eting specifications below 32.00c; 99.8% er (arsenic 0.05% max.; other impuri- % max.) 32.50c; f.o.b. Laredo, Tex., lk shipments. Foreign, 99%; Chinese English, 32.75c; Belgian, 32.75c, duty ew York.
Electrolytic cathodes, 99.9%, base sizes inery, unpacked, 50.50c; 25-lb pigs, "XX" nickel shot, 54.15c; "F" nickel r ingots, for addition to cast iron, Prices include import duty.
v: Open market, spot, small lots, New $150-$158, per 76-lb flask.
m-Copper: 3.75-4.25% Be, $1.56 per lloy, f.o.b., Reading, Pa.
m: "Regular" straight or flat forms, del.; special or patented shapes $2.80. 97.99%, $2.10 per lb for 500 lb (kegs); per lb for 100 lb (case); $2.17 per lb 00 lb.
U. S. Treasury, $35 per ounce.
Open market, New York 80.00c per oz.
m: $90-$93 per ounce from refineries.
um: $24 per troy ounce.
: $200 per troy ounce.
m (sponge form): $5 per pound.

ed, Drawn, Extruded Products

COPPER AND BRASS

se prices, cents per pound, f.o.b. mill)
Copper 39.93-41.68; yellow brass 36.86- commercial bronze, 95%, 39.91-41.61; 39.48-41.13; red brass, 85%, 38.54-40.14; 38.12-39.67; best quality, 39.15; nickel 18%, 50.57-51.91; phosphor-bronze A, 5%, 58.49-60.20.
Copper, hot-rolled 35.78-37.53; cold- 37.03-38.78; yellow brass free cutting, 2.63; commercial bronze, 95%, 39.60- 90%, 39.17-40.82; red brass 85%, 38.23- 80%, 37.81-39.36.
ss Tubing: Copper 39.97-41.72; yellow 39.87-41.29; commercial bronze, 90%, 3.79; red brass, 85%, 41.45-43.05; 80%,
Yellow brass 37.15-38.57; commercial , 95%, 40.20; 90%, 39.77-41.42; red 85%, 38.83-40.43; 80%, 38.41-39.96; uality brass, 39.44.
Wire: Bare, soft, f.o.b. eastern mills, .67-29.42, l.c.l. 29.17-29.92, 100,000 lb .545-29.295; weatherproof, f.o.b. eastern c.l. 29.60, l.c.l. 30.10, 100,000 lb lots magnet, del., 15,000 lb or more 34.50, 5.25.

ALUMINUM

(30,000 lb base; freight allowed on 500 lb or more, but not in excess of rate applicable on 30,000 lb c.l. orders.)
Sheets and Circles: 2S and 3S mill finish c.l.

Thickness Range, Inches	Widths or Diameters, In., Incl.	Flat Sheet Base*	Coiled Sheet Base	Coiled Sheet Circle† Base
0.249-0.136	12-48	30.1	...	...
0.135-0.096	12-48	30.6	...	...
0.095-0.077	12-48	31.2	29.1	33.2
0.076-0.061	12-48	31.8	29.3	33.4
0.060-0.048	12-48	32.1	29.5	33.7
0.047-0.038	12-48	32.5	29.8	34.0
0.037-0.030	12-48	32.9	30.2	34.6
0.029-0.024	12-48	33.4	30.5	35.0
0.023-0.019	12-36	34.0	31.1	35.7
0.018-0.017	12-36	34.7	31.7	36.6
0.016-0.015	12-36	35.5	32.4	37.6
0.014	12-24	36.5	33.3	38.9
0.013-0.012	12-24	37.4	34.0	39.7
0.011	12-24	38.4	35.0	41.2
0.010-0.0095	12-24	39.4	36.1	42.7
0.009-0.0085	12-24	40.6	37.2	44.4
0.008-0.0075	12-24	41.9	38.4	46.1
0.007	12-18	43.3	39.7	48.2
0.006	12-18	44.8	41.0	52.8

* Lengths 72 to 180 inches. † Maximum diameter, 26 inches.

Screw Machine Stock: 5000 lb and over.

Diam. (in.) or distance across flats	—Round— R317-T4, 17S-T4	R317-T4	——Hexagonal—— 17S-T4
0.125	52.0	....	....
0.156-0.188	44.0	....	....
0.219-0.313	41.5	....	....
0.375	40.0	46.0	48.0
0.406	40.0	....	....
0.438	40.0	46.0	48.0
0.469	40.0	....	....
0.500	40.0	46.0	48.0
0.531	40.0	....	....
0.563	40.0	....	45.0
0.594	40.0	....	....
0.625	40.0	43.5	45.0
0.688	40.0	....	45.0
0.750-1.000	39.0	41.0	42.5
1.063	39.0	....	41.0
1.125-1.500	37.5	39.5	41.0
1.563	37.0	....	....
1.625	36.5	....	39.5
1.688-2.000	36.5	....	....

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets: Full rolls, 140 sq ft or more $22.00 per cwt; add 50c cwt 10 sq ft to 140 sq. ft. Pipe: Full coils $22.00 per cwt. Traps and bends: List prices plus 60%.

ZINC

Sheets, 24.50c, f.o.b. mill 36,000 lb and over. Ribbon zinc in coils, 23.00c, f.o.b. mill, 36,000 lb and over. Plates, not over 12-in., 23.50-24.50c; over 12-in., 23.50-24.50c.

"A" NICKEL

(Base prices f.o.b. mill)

Sheets, cold-rolled, 71.50c. Strip, cold-rolled 77.50c. Rods and shapes, 67.50c. Plates, 69.50c. Seamless tubes, 100.50c.

MONEL

(Base prices, f.o.b. mill)

Sheets, cold-rolled 57.00c. Strip cold-rolled 60.00c. Rods and shapes, 55.00c. Plates, 56.00c. Seamless tubes, 90.00c. Shot and blocks, 50.00c.

MAGNESIUM

Extruded Rounds, 12 in. long, 1.31 in. in diameter, less than 25 lb, 55.00-62.00c; 25 to 99 lb, 45.00-52.00c; 100 lb to 5000 lb, 41.00c.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill) Sheets, $15; sheared mill plate, $12; strip, $15; wire, $10; forgings, $6; hot-rolled and forged bars, $6.

Plating Materials

Chromic Acid: 99.9% flake, f.o.b. Philadelphia, carloads, 27.00c; 5 tons and over 27.50c; 1 to 5 tons, 28.00c; less than 1 ton 28.50c.
Copper Anodes: Base 2000 to 5000 lb; f.o.b. shipping point, freight allowed; Flat untrimmed 37.69c; oval 37.19c; cast 37.375c.
Copper Cyanide: 70-71% Cu, 100-lb drums, 1000 lb 61.9c, under 1000 lb 63.9c, f.o.b. Niagara Falls, N. Y.
Sodium Cyanide: 96-98%, ½-oz ball, in 200 lb drums, 1 to 900 lb, 19.00c; 1000 to 19,900 lb, 18.00c, f.o.b. Niagara Falls, N. Y. Packaged in 100 lb drums add ½-cent.
Copper Carbonate: 54-56% metallic Cu; 50 lb bags, up to 200 lb, 29.25c; over 200 lb 28.25c, f.o.b. Cleveland.
Nickel Anodes: Rolled oval, carbonized, carloads, 70.00c; 10,000 to 30,000 lb, 68.00c; 3000 to 10,000 lb, 71.00c, 500 to 3000 lb, 72.00c; 100 to 500 lb, 74.00c; under 100 lb, 77.00c; f.o.b. Cleveland.
Nickel Chloride: 100-lb kegs, 35.00c; 400-lb bbl. 33.00c up to 10,000 lb, 32.50c; over 10,000 lb, f.o.b. Cleveland, freight allowed on barrels, or 4 or more kegs.
Tin Anodes: Bar, 1000 lb and over, nom.; 500 to 999 lb, nom.; 200 to 499 lb, nom.; less than 200 lb, nom.; ball, 1000 lb and over, nom.; 500 to 999 lb, nom.; 200 to 499 lb, nom.; less than 200 lb, nom.; f.o.b. Sewaren, N. J.
Sodium Stannate: 25 lb cans only, less than 100 lb, to consumers nom.; 100 or 300 lb drums only, 100 to 500 lb, nom.; 600 to 1900 lb, nom.; 2000 to 9900 lb, nom.; f.o.b. Sewaren, N. J. Freight not exceeding St. Louis rate allowed.
Zinc Cyanide: 100 lb drums, less than 10 drums 47.7c, 10 or more drums 45.7c, f.o.b. Niagara Falls, N. Y.
Stannous Sulphate: 100 lb kegs or 400 lb bbl, less than 2000 lb nom.; more than 2000 lb, nom., f.o.b. Carteret, N. J.
Stannous Chrolide (Anhydrous): In 400 lb bbl, nom.; 100 lb kegs nom., f.o.b. Carteret, N. J.

Scrap Metals

BRASS MILL ALLOWANCES

Prices in cents per pound for less than 15,000 lb, f.o.b. shipping point.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	23.00	23.00	22.25
Yellow Brass	20.125	19.875	18.75
Commercial Bronze			
95%	21.875	21.625	21.125
90%	21.75	21.50	21.00
Red brass			
85%	21.50	21.25	20.75
80%	21.375	21.125	20.625
Munts metal	19.00	18.75	18.25
Nickel, silver, 10%	22.25	22.00	11.125
Phos. bronze, A	24.00	23.75	22.75

BRASS INGOT MAKERS' BUYING PRICES

(Cents per pound, delivered eastern refineries, carload lots)

No. 1 copper 21.50*; No. 2 copper 20.00*; light copper 19.00*; composition red brass 22.00-22.50; radiators 17.25; heavy yellow brass 17.00.

* Nominal.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 21.50*; No. 2 copper 20.00*; light copper 19.00*; refinery brass (60% copper) per dry copper content 19.50.

* Nominal

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots)

Copper and brass: Heavy copper and wire, No. 1 20.00; No. 2 18.50; light copper 17.25; No. 1 composition red brass 17.00-17.50; No. 1 composition turnings 16.50-17.00; mixed brass turnings 12.00-12.50; new brass clippings 17.50-18.00; No. 1 brass rod turnings 16.00-16.50; light brass 11.00; clean heavy yellow brass 14.50-15.00; new brass rod ends 16.50-17.00; auto radiators 14.50-15.00; cocks and faucets, 15.50-16.00; brass pipe 17.00-17.50.
Lead: Heavy 14.50-14.75; battery plates 8.75-9.00; linotype and stereotype 14.50-14.75; electrotype 12.75-13.00; mixed babbitt 12.25-12.50.
Zinc: Old zinc 11.00-11.25; new die cast scrap 10.75-11.00; old die cast scrap 8.00-8.25.
Tin: No. 1 pewter 63.00-65.00; block tin pipe 90.00; No. 1 babbitt 58.00-60.00.
Aluminum: Clippings 2S 19.00-19.50; old sheets 15.50-16.00; crankcase 15.50-16.00; borings and turnings 12.00-12.50.

DAILY PRICE RECORD

	Copper	Lead	Zinc	Tin	Aluminum	Antimony	Nickel	Silver
	24.50	16.80	17.50	157.00	19.00	32.00	50.50	80.00
	24.50	16.80	17.50	153.00	19.00	32.00	50.50	80.00
	24.50	16.80	17.50	150.00	19.00	32.00	50.50	80.00
vg.	24.50	16.80	17.50	144.74	19.00	32.00	49.40	80.00
9-30	24.50	16.80	17.50	150.00	19.00	32.00	50.50	80.00
8	24.50	16.80	17.50	151.00	19.00	32.00	50.50	80.00
2-27	24.50	16.80	17.50	150.00	19.00	32.00	50.50	80.00
1	24.50	16.80	17.50	148.50	19.00	32.00	50.50	80.00
0	24.50	16.80	17.50	150.00	19.00	32.00	50.50	80.00
9	24.50	16.80	17.50	155.00	19.00	32.00	50.50	80.00
8	24.50	16.80	17.50	147.00	19.00	32.00	50.50	80.00
5-16	24.50	16.80	17.50	146.00	19.00	32.00	50.50	80.00
4	24.50	16.80	17.50	142.00	19.00	32.00	50.50	80.00

: Copper; Electrolytic, del. Conn. Valley; Lead, common grade, del. St. Louis; Zinc, prime n, E. St. Louis; Tin, Straits, del. New York; Aluminum primary ingots, 99%, del.; Antimony, f.o.b. Laredo, Tex.; Nickel, electrolytic cathodes, 99.9%, base sizes at refinery unpacked; open market, New York. Prices, cents per pound; except silver, cents per ounce.

IRON AND STEEL SCRAP

Consumers prices, except as otherwise noted, including brokers' commissions, as reported to STEEL, Jan. 4, 1951; gross tons
Changes shown in italics.

STEELMAKING SCRAP COMPOSITE

Jan. 4	$45.50
Dec. 28	45.50
Dec. 1950	45.50
Jan. 1950	26.93
Jan. 1946	19.17

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

PITTSBURGH

No. 1 Heavy Melt.	$46.50
No. 2 Heavy Melt.	44.50
No. 1 Busheling	46.50
No. 1 Bundles	46.50
No. 2 Bundles	43.50
Heavy Turnings	47.00-48.00
Machine Shop Turnings	38.50
Mixed Borings, Turnings	38.50
Short Shovel Turnings.	40.50
Cast Iron Borings	39.50-40.50
Low Phos. Steel	56.00-57.00

Cast Iron Grades

No. 1 Cupola Cast	57.00-58.00
No. 1 Machinery Cast.	67.00-68.00
Charging Box Cast	55.00-56.00
Heavy Breakable Cast.	54.00-55.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	46.50
Rails, Random Lengths	64.00-65.00
Rails, 2 ft and under.	68.00-69.00
Rails, 18 in. and under	69.00-70.00
Railroad Specialties	64.00-65.00

CLEVELAND

(Delivered Consuming Plant)

No. 1 Heavy Melt. Steel	$45.50-46.00†
No. 2 Heavy Melt. Steel	43.50-44.00†
No. 1 Busheling	45.50-46.00†
No. 1 Bundles	45.50-46.00†
No. 2 Bundles	40.00-42.00
Machine Shop Turnings	37.50-38.00
Mixed Borings, Turnings	39.00-40.00
Short Shovel Turnings.	39.00-40.00
Cast Iron Borings	39.50-40.00
Low Phos.	48.00-48.50

Cast Iron Grades

No. 1 Cupola	65.00-66.00
Charging Box Cast	53.00-54.00
Stove Plate	55.00-56.00
Heavy Breakable Cast.	55.00-56.00
Unstripped Motor Blocks	44.00-45.00
Brake Shoes	50.00-51.00
Clean Auto Cast	65.00-66.00
Burnt Cast	46.00-47.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	46.00-46.50
R.R. Malleable	72.00-73.00
Rails, 3 ft and under..	70.00-71.00
Rails, 18 in. and under	71.00-72.00
Rails, Random Lengths	64.00-65.00
Cast Steel	58.00-59.00
Railroad Specialties	60.00-61.00
Uncut Tires	60.00-61.00
Angles, Splice Bars	65.00-66.00

† Plus applicable springboards

VALLEY

No. 1 Heavy Melt. Steel	$46.00-46.50†
No. 2 Heavy Melt. Steel	44.00-44.50†
No. 1 Bundles	46.00-46.50†
Facty. Prod. Bundles.	46.00-46.50†
No. 2 Bundles	40.50-42.50
Machine Shop Turnings	38.00-38.50
Short Shovel Turnings.	40.00-40.50
Cast Iron Borings	40.00-40.50
Low Phos.	48.50-49.00

† Plus applicable springboards

Railroad Scrap

No. 1 R.R. Heavy Melt.	46.00-46.50

PHILADELPHIA

No. 1 Heavy Melt. Steel	$45.00
No. 2 Heavy Melt. Steel	43.00
No. 1 Busheling	43.00
No. 1 Bundles	45.00
No. 2 Bundles	42.00
Short Shovel Turnings.	39.00
Machine Shop Turnings	37.00
Mixed Borings, Turnings	37.00
Low Phos. Punchings and Plate, elec. fur. grade	51.00
Low Phos. Plate, 5 ft. & Under	51.00
Elec. Furnace Bundles.	48.00-49.00
Heavy Turnings	45.00
No. 1 Chemical Borings	45.00
Knuckles and couplers.	56.00-58.00
Steel car wheels	56.00-58.00

Cast Iron Grades

No. 1 Cupola Cast	54.00-55.00
No. 1 Machinery Cast.	58.00-60.00
No. 1 Yard Cast	52.00-53.00
Charging Box Cast	54.00-55.00
Heavy Breakable Cast.	54.00-55.00
No. 1 Wheels	70.00*
Malleable	*70.00-72.00*

* Nominal

CINCINNATI

No. 1 Heavy Melt. Steel	$46.00
No. 2 Heavy Melt. Steel	44.00
No. 1 Busheling	46.00
No. 1 Bundles	46.00
No. 1 Black Bundles	46.00
Machine Shop Turnings.	*33.00*
Short Shovel Turnings.	*34.00*
Mixed Borings, Turnings	*33.00*
Cast Iron Borings	34.00

Cast Iron Grades

No. 1 Cupola Cast	70.00
Charging Box Cast	60.00
Stove Plate	55.00
Heavy Breakable Cast.	56.00
Unstripped Motor Blocks	42.00
Brake Shoes	37.00
Clean Auto Cast	70.00
Drop Broken Cast	72.50
Low Phos., 18 in. and under	62.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	46.00
R.R. Malleable	64.00
Rails, Rerolling	65.00
Rails, Random Lengths	65.00
Rails, 18 in. and under	72.50

DETROIT

(Brokers' buying prices, f.o.b. shipping point)

No. 2 Heavy Melt. Steel	$38.25-39.00
No. 1 Bundles	*40.25-50.00*
No. 2 Bundles	37.25-37.50
No. 1 Busheling	40.25-45.00
Machine Shop Turnings	32.25-33.00
Forge Flashings	40.25-45.00
Short Shovel Turnings.	34.25-35.00
Cast Iron Borings	34.00-35.00
Punchings & Plate Scrap	42.75-46.00

Cast Iron Grades

No. 1 Cupola Cast	59.00-60.00
Heavy Breakable Cast.	48.00-50.00
Clean Auto Cast	62.00-64.00

BUFFALO

No. 1 Heavy Melt. Steel	$44.50-45.25
No. 2 Heavy Melt. Steel	42.50-43.25
No. 1 Busheling	42.50-43.25
No. 1 Bundles	43.50-44.25
No. 2 Bundles	41.50-42.25
Machine Shop Turnings	36.50-37.25
Mixed Borings, Turnings	36.50-37.25
Cast Iron Borings	36.50-37.25
Short Shovelings	38.50-39.25
Low Phos.	48.25-49.00

Cast Iron Grades

No. 1 Cupola	54.00-55.00
No. 1 Machinery	59.00-60.00
Malleable	nominal

Railroad Scrap

Rails, 2 ft and under..	60.00-61.00
Rails, random size	55.00-56.00
Railroad Specialties	55.00-56.00

NEW YORK

(Brokers' buying prices f.o.b. shipping point)

No. 1 Heavy Melt. Steel	$39.00
No. 2 Heavy Melt. Steel	37.00
No. 1 Busheling	38.00-39.00
No. 1 Bundles	39.00
No. 2 Bundles	36.00
Mixed Borings, Turnings	31.00
Machine Shop Turnings	31.00
Short Shovel Turnings.	33.00
Punchings & Plate Scrap	41.50
Low Phos. Plate, 5 ft & under	41.50
Elec. Furnace Bundles.	41.50

Cast Iron Grades

No. 1 Cupola Cast	47.00-48.00
No. 1 Machinery	49.00-50.00
Charging Box Cast	44.00-45.00
Heavy Breakable	44.00-45.00
Unstripped Motor Blocks	41.00-42.00

BOSTON

(F.o.b. shipping point)

No. 1 Heavy Melt. Steel	$35.67
No. 2 Heavy Melt. Steel	33.67
No. 1 Bundles	35.67
No. 1 Busheling	*35.67*
Machine Shop Turnings	27.67
Mixed Borings, Turnings	27.67
Short Shovel Turnings.	*29.67*
Bar Crops and Plate.	44.50-45.00
Punchings & Plate Scrap	44.50-45.00
Chemical Borings	*33.00-34.00*

Cast Iron Grades

No. 1 Cupola Cast	*46.00-47.00*
Mixed Cast	*44.00-45.00*
Heavy Breakable Cast	*43.00-43.50*
Stove Plate	42.00-43.00

CHICAGO

No. 1 Heavy Melt. Steel	$45.00
No. 2 Heavy Melt. Steel	43.00
No. 1 Bundles	45.00
No. 2 Bundles	42.00
Machine Shop Turnings	35.00-36.00
Mixed Borings, Turnings	35.00-36.00
Short Shovel Turnings.	37.00-38.00
Cast Iron Borings	36.00-37.00
Low Phos.	52.00-54.00
Elec. Furnace Bundles.	46.00-48.00
Heavy Turnings	41.00-42.00
Cut Structurals	50.00-51.00

Cast Iron Grades

No. 1 Cupola Cast	62.00-64.00
Clean Auto Cast	65.00-66.00
No. 1 Wheels	*60.00-62.00*
Stove Plate	40.00-50.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	46.00-47.00*
Malleable	73.00-75.00
Rails, Rerolling	66.00-68.00*
Rails, Random Lengths	59.00-60.00
Rails, 2 ft, and under..	68.00-69.00
Rails, 18 in. and under	69.00-70.00
Railroad Specialties	*58.00-59.00*
Angles, Splice Bars	*59.00-60.00*

* Brokers' buying price.

BIRMINGHAM

No. 1 Heavy Melt. Steel	$43.50
No. 2 Heavy Melt. Steel	41.50
No. 1 Busheling	43.50
No. 2 Bundles	40.50
Machine Shop Turnings	35.50
Mixed Borings, Turnings	35.50
Short Shovel Turnings.	37.50
Cast Iron Borings	28.00
Bar Crops and Plate.	46.00-47.00
Cut Structurals	46.00-47.00

Cast Iron Grades

No. 1 Cupola Cast	59.00-60.00
Stove Plate	59.00-60.00
No. 1 Wheels	nominal

Railroad Scrap

No. 1 R.R. Heavy Melt.	43.50
R.R. Malleable	nominal
Rails, Rerolling	60.00-61.00
Rails, 2 ft and under..	65.00-66.00
Angles and Splice Bars.	59.00-60.00

ST. LOUIS

No. 1 Heavy Melt. Steel	*$46.00-47.0*
No. 2 Heavy Melt. Steel	41.50-42.5
No. 1 Bundles	46.00-47.0
No. 2 Bundles	*40.50-41.*
Machine Shop Turnings	33.00-34.0
Short Shovel Turnings.	35.00-37.0

Cast Iron Grades

No. 1 Cupola Cast	*58.00-60.0*
Charging Box Cast	*51.00-53.0*
Heavy Breakable Cast.	*56.00-57.0*
Brake Shoes	56.00-58.0
Clean Auto Cast	65.00-67.0
Burnt Cast	*53.00-54.0*

Railroad Scrap

R.R. Malleable	*63.00-65.0*
Rails, Rerolling	66.00-68.0
Rails, Random Lengths	59.00-61.0
Rails, 2 ft and under..	65.00-67.0
Uncut Tires	*57.00-58.0*
Angles, Splice Bars	66.00-68.0
Railroad Specialties	*60.00-62.0*

SAN FRANCISCO

No. 1 Heavy Melt. Steel	$30.0
No. 2 Heavy Melt. Steel	28.0
No. 1 Bundles	30.0
No. 2 Bundles	28.0
No. 3 Bundles	25.0
Machine Shop Turnings	16.0
Low Phos. Electric	45.0

Cast Iron Grades

No. 1 Cupola Cast	*43.00-45.0*

Railroad Scrap

No. 1 R.R. Heavy Melt.	30.0
Rails, Random Lengths	30.0

SEATTLE

No. 1 Heavy Melt. Steel	$28.0
No. 2 Heavy Melt. Steel	26.0
No. 1 Busheling	25.50-26.0
Nos. 1 & 2 Bundles	25.50-26.0
No. 3 Bundles	22.0
Machine Shop Turnings	20.0
Mixed Borings, Turnings	20.0
Punchings & Plate Scrap	40.00-44.0
Cut Structurals	40.00-44.0

Cast Iron Grades

No. 1 Cupola Cast	42.00-44.0
Heavy Breakable Cast.	38.00-40.0
Stove Plate	36.00-38.0
Unstripped Motor Blocks	33.00-35.0
Malleable	33.00-35.0
Brake Shoes	35.0
Clean Auto Cast	40.0
No. 1 Wheels	40.0

Railroad Scrap

No. 1 R.R. Heavy Melt.	29.0
Railroad Malleable	35.0
Rails, Random Lengths	29.00-30.0
Angles and Splice Bars	29.00-30.0

LOS ANGELES

(Delivered prices)

No. 1 Heavy Melt. Steel	$30.0
No. 2 Heavy Melt. Steel	28.0
No. 1 Bundles	*30.0*
No. 2 Bundles	*28.0*
No. 3 Bundles	*25.0*
Machine Shop Turnings	16.0
Punchings & Plate Scrap	*40.0*

Cast Iron Grades

No. 1 Cupola Cast	*45.00-48.0*

Railroad Scrap

No. 1 R.R. Heavy Melt.	nomina
Rails, Rerolling	*48.0*

HAMILTON, ONT.

(Delivered prices)

Heavy Melt.	$30.0
No. 1 Bundles	30.0
Mechanical Bundles	28.0
Mixed Steel Scrap	28.0
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Sheets, Strip . . .

Sheet and Strip Prices, Page 93 & 94

Cleveland — Little open tonnage will be available for the trade this month, production being taken up by the overflow from fourth quarter and rated commitments. Producers expect to clear up the carryover before end of the month but they hold out little promise of any improvement in supply conditions in succeeding months. February allotments are smaller and with emergency needs rising further cuts in quotas on unrated accounts are indicated. At the moment all the signs point to intensification of acute supply conditions in the light, flat-rolled products. However, in some quarters the view is expressed that cutbacks in civilian goods production resulting from acute shortages of nonferrous metals will shortly be reflected in much easier general steel supply conditions.

New York—While sheet sellers are booked through the current quarter on silicon sheets for non-rated account because of the longer processing time, few, if any, have yet taken such action on the major grades of carbon sheets except for preference work. It probably will be another week before mills set up their schedules for March on ordinary civilian work and when the time comes it is likely there will be further curtailment in tonnage available for this purpose. On DO-rated account producers are booked well into second quarter on the basis of minimum percentage quotas set up by government regulation. Actually some mills are accepting more DO-rated work than the minimum quotas call for. Stainless steel is moving almost entirely into defense work, except some of the plain chrome grades.

Boston—Rated orders for hot and cold-rolled, notably narrow strip, are extended well through second quarter. Backlogs are unbalanced under current limitation maximums. Wide range of prices for cold-rolled strip prevails without any influence on demand. Spread at New Haven is $14 per ton on low carbon. Price increases by nonintegrated mills in some cases were made after Dec. 1 when hot strip was advanced.

Philadelphia—Non-rated sheet consumers appear reconciled to further cuts in their allocations for March once schedules are finally set up by the mills within the next week or so. Defense work is taking an increasing amount of tonnage. Even though March is a longer month than February, it seems likely that sheet supply for commercial needs will be further reduced.

Pittsburgh—Weirton Steel Co. has issued a new extra card covering electrolytic zinc coated sheets. Revisions include increase of $3 to $7 per ton in gage and width extras for 26 gage and heavier ;$4 per ton for special killed steel quality; $5 for restricted thickness tolerance and $6 for stretcher leveled standard of flatness extra.

Item quantity brackets were augmented to include larger quantities just under 20,000 pounds, while quantity brackets under 2000 pounds were deleted and extras were increased $4 to $6 per ton.

Complete revision in packaging extras also was incorporated in the card in line with upward adjustments previously reported on hot and cold-rolled sheets.

Sheet sellers are booked through March and beyond on rated tonnage to the percentage maximum they are obliged to accept. Most interests have been forced to devote all of January output, and about half of February to yearend carryover tonnage.

Cincinnati — Steadily increasing sheet tonnage on priorities is lowering the volume for non-rated consumers. Despite announced curtailments in some end-use production lines, cutbacks are not reflected in sheet demand. A hot-strip mill at Middletown of Armco Steel Corp. is being revamped.

Chicago — Cutbacks being announced in the automobile, appliance and other industries are only a forerunner of more and worse to come. They are forced by the quantities of steel that can be acquired and definitely do not reflect declining consumer demand. Sheets and strip are the shortest of all steel products and it is to them that cutbacks are geared. January production of these items goes entirely to carryover catchup. February schedules leave disappointing tonnage for civilian distribution and in only a few days producers will be working out March quotas. From all indications free steel in the latter month will be considerably less than for February.

Plates . . .

Plate Prices, Page 93

Boston — Shipyards in need of work look for support in the authorization of 50 fast cargo ships. Fabricating shops are also expected to benefit. Thus far subcontracting business involving plates has been small. Tonnage required for these ships will cut into civilian allocations.

New York—Most plate sellers will not accept nonrated tonnage for March before the middle of this month, at which time they will make allocations of such specifications as have already been received and are yet to come in. Specifications will be much heavier than the mills will be able to handle. Some producers claim their free tonnage in March will be even less than in February. Various mills have accepted DO-rated orders for shipment well into the second quarter, although they have taken no formal action on programmed tonnage for that period.

Philadelphia—While March will have two more working days, some plate producers doubt they will have more tonnage to supply against nonrated orders than in February. DO-rated orders are expanding and in addition some special directives are beginning to appear. These are expected to cut into March allocations of nonrated tonnage despite the fact more strip plate will be available by that time.

Pittsburgh — Yearend carryover tonnage varied considerably among plants and also between sheared and universal mill plates, the overflow ranging 3 to 6 weeks. January rate tonnage will amount to between 2 and 30 per cent of total production of some producers. Nearly the entire output of the mills is on a rated basis among those interests that recently started producing light plate on strip mills. Fabricators are reconciled to continued diminishing supply throughout 1951 for nondefense use. Dravo Corp. recently was awarded a contract by U. S. Steel Co for a twin-screw, diesel-propelled towboat, making the seventh such boat placed with Dravo in the past six months.

Seattle — Scarcity of plates is cramping the smaller shops lacking defense orders. In some cases operations have slowed perceptibly. Backlogs are low. Some unstated contracts for secret military installations have been placed.

Semifinished Steel . . .

Semifinished Prices, Page 93

San Francisco—Bethlehem Pacific Coast Steel Corp. now is producing forging quality carbon steel billets in a variety of sizes. The product is being produced at the company's plants in South San Francisco, Los Angeles and Seattle.

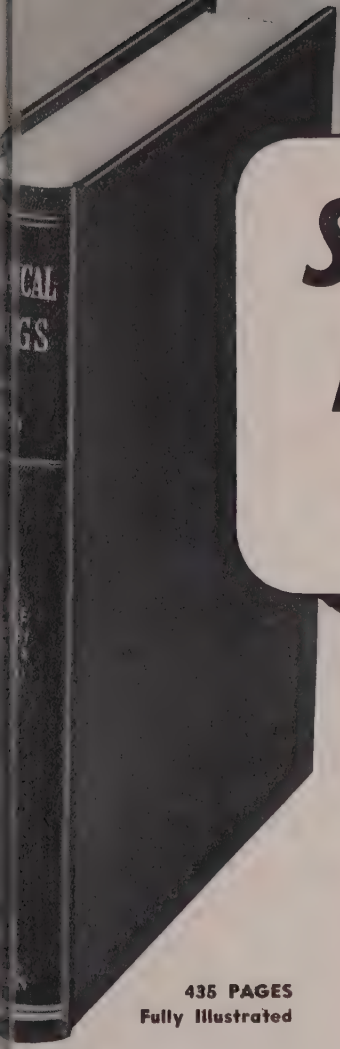
Steel Bars . . .

Bar Prices, Page 93

New York—Producers of hot carbon bars generally have accepted orders, non-rated as well as rated, for shipment through February, and a few through March as well. Actually by the middle of this month it is believed most all producers will have set up their schedules for the entire quarter, subject to possible last minute changes in order to handle special emergency work. So far there have been relatively few DO orders but this situation is expected to shift fairly rapidly within the next few weeks as defense work becomes more accelerated. Cold carbon bar producers are booked well into second quarter, but they are moving with increasing caution because of uncertainty as to how much hot stock they will be able to obtain as time goes on, except for DO rated orders.

Boston—Forge shops account for the bulk of rated orders for carbon and alloy bars. Such volume is expanding. Carbon bar carryovers are heavy with unrated allocations reduced in proportion. February quotas will be limited by somewhat larger tonnage of DO orders. While cold-finished bar output is reduced by subnormal production of one leading district producer, several nonintegrated cold-drawing mills have better inventory on hot-rolled bars.

Pittsburgh—Demand for alloy bars exceeds supply by a wide margin, and conditions are expected to become even more critical due to scarcity of nickel and other alloying elements. In addition to increased requirements for military-end uses, sellers are faced with the probability shipments to petroleum interests and for other indirect military needs will be augmented throughout most of this year. Uncertain steel supply



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makes it increasingly difficult for coldfinishers to book additional tonnage other than rated orders. Hot-rolled bar interests note a preference for large rounds among rated orders booked for January and February production schedules. A 20 mm shell order involving around 4000 tons of coldfinished quality is pending.

Cleveland—Merchant bar sellers are booked through February and there is little chance any open tonnage will become available to the general trade over coming weeks. Expectations are March allotments to un-rated accounts will be smaller than February's though some hopes are held out for a slight easing in tight supply conditions before end of first quarter as result of cutbacks in civilian goods production. Alloy bar demand is extremely heavy, and all of it is not coming from military and related account. Machine tool builders and the automotive industry are reported aggressively seeking tonnage. Non-integrated cold-drawn barmakers are booked up well into the future but they are concerned as regards their ability to meet delivery schedules in view of the tight supply conditions in hot-rolled bars.

Structural Shapes . . .

Structural Shape Prices, Page 93

Philadelphia—Far extended delivery promises on fabricated steel are discouraging builders in going ahead with plans for various projects. Some larger fabricators are promising little for shipment under a year or more. Others have little to offer under 10 to 11 months. Considerable work is still being figured and as the defense program gets under greater swing more will come up for estimating. At present, shops are experiencing further curtailment in allocation of shapes and plates by the mills.

The Morrisville, Pa., steel mill project of the United States Steel Corp. will require 125,000 tons of structurals and 8000 tons of steel piling, as well as heavy quantities of reinforcing steel, pipe and other miscellaneous products.

Boston — Reflecting higher plain material and shop costs, fabricated structural steel prices are stronger. Escalator clauses in old contracts are being invoked, reducing contractors' margins where this potential increase was included in original steel estimates. Commercial construction inquiry is slackening with higher ratio of industrial building being rated, including a 700-ton warehouse, Raytheon Mfg. Co., Waltham, Mass. with six months delivery wanted on fabricated steel. Substantial volume of bridge work is yet to be advertised for contracting. A 350-ton overpass, Darien, Conn., brought out a high bid of 20.00c per pound for fabricated steel in place. Lowest total estimate included a 17.00c bid for steel.

New York — Structural bookings for the first 11 months of 1950 amounted to 2,286,821 tons, against 1,308,721 tons in the corresponding period of 1949, an increase of 75 per cent according to the American Institute of Steel Construction. November bookings were 230,020 tons, against a revised figure of 233,447 tons in October, and 103,557 tons in November of the preceding year.

November shipments were 154,640 tons, or 32 per cent greater than for the corresponding period of 1949. Shipments for the first 11 months amounted to 1,741,265 tons, slightly better than 1,718,036 tons shipped during the same period of the preceding year. October shipments have been revised to a figure of 181,050 tons.

Backlogs for the four months beginning Dec. 1, 1950 increased to 762,732 tons.

Pittsburgh—Scarcity of standard shapes and wide flange beams for non-defense use is expected to become more acute. In addition to steadily expanding direct and indirect military needs the amount of structural steel involved for currently projected steel expansion programs will be an increasingly important factor throughout this year. About 4000 tons of steel and iron are required to build a blast furnace rated at 1200 tons daily. Amount of steel necessary for facilities other than structural buildings in connection with steel mill facilities expansion is difficult to state in specific tonnage figures because of the complexity of requirements, for example, of motors, cranes, generators, finishing mills, etc.

Los Angeles—Demand for structurals is stronger. Seven-month state building program totaling $69.5 million will go out for bids. Officials say work will start on schedule—defense priorities permitting.

Seattle—Shapes are in strong demand, military projects in Alaska calling for heavy tonnages. Plans are in preparation for five steel frame shop buildings, one 400 x 100 feet, at Fort Richardson, bids to U. S. engineers, Seattle, in about 60 days. Steel is in scarce supply, particularly specifications rolled by eastern mills.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 93

Boston—One supplier quoted on but one half of approximately 700 tons steel mat reinforcement for Connecticut expressways, original No. 2 alternate, 244,257 square yards, 13 feet length. This was American Steel & Wire Co., total of $47,634.48, delivered, for but 50 per cent of wanted yardage. Demand for concrete reinforcing bars exceeds supply.

Chicago — Suppliers of reinforcing steel are amazed at the volume of new construction work coming out for bidding. It is inconceivable that many of the projects can go ahead with the steel supply situation worsening month by month. Many interests do not bother to follow inquiries other than those in which there is some possibility of providing steel should bidding be successful.

Los Angeles—Demand for reinforcing bars in 1950 was sustained by the biggest building boom in this district's history. Building valuation in Los Angeles county the past year totaled $400 million, $27 million higher than the previous record in 1948, 42.3 per cent higher than valuation in 1949.

Seattle—Mill backlogs are larger than usual at end of the year, although they are down from October. Inquiry is insistent, especially for small tonnages. Grain elevator construction in eastern Washington active, involving considerable reinforcing bar stock. Largest reinforcing job pending, 5000 tons for Seattle's viaduct, is up for bids Jan. Mills are booked through first quarter, one plant to June 30. Northwest Steel Rolling Mills, Inc., Seattle resumed rolling Jan. 8.

Tubular Goods . . .

Tubular Goods Prices, Page 96

Pittsburgh — Gulf Oil Corp. has filed plans with petroleum defense authorities for construction of a 26-in. diameter 440-mile crude oil pipe line extending from West Texas producing area to refineries on the Gulf coast with a connection in eastern Texas to northbound crude lines serving refineries in the Ohio Valley and Great Lakes region. Construction is contemplated in late summer with completion early in 1952. Estimated main line capacity will be 300,000 barrels per day. Associated with Gulf are four other oil companies—Cities Service, Pure Oil, Sun Oil and Standard of Ohio.

Wire . . .

Wire Prices, Page 95

Cleveland—Wiremakers are booked well ahead and there is no prospect of any particular easing in supply conditions for months to come. DO and other emergency-rated business is increasing. However, bulk of mill shipments still is into regular consuming channels. Demand exceeds output by a wide margin and producers are distributing available tonnage as equitably as possible. They are keeping a close check on shipments to prevent hoarding and accumulation of supplies by speculators.

Considerable uncertainty is encountered in the trade with respect to the status of some current wire price schedules under the government's recent rollback order. Some wire makers did not put their recent increases into effect until after Dec. 1, the rollback date. Whether they will be required to rescind the advances is a moot question at the moment.

Boston — Allocations to civilian goods producers, maintained through February schedules, are expected to be reduced in some categories in March. Rated defense orders are heavier and for some products are at limitation maximums into second quarter. Manufacturers of civilian wire goods are expected to be the first to suffer reductions in quotas. Several leading industrial users will get ample tonnage due to their direct or indirect connection with armament expansion. More rated orders are appearing for aircraft.

Los Angeles — Bethlehem Pacific Coast Steel Corp. is accepting DO rated orders for second half. Demand is unprecedented for wire products.

Plate . . .

Tin Plate Prices, Page 94

tsburgh—Adjustments in line the 20 per cent reduction in of pig tin ordered by NPA have incorporated in January and uary production schedules. How- full scale adjustment is not ble until NPA issues a restrain- order on end-use of tin plate. of producers' new tin plate s became effective Jan. 1 last, exception being U. S. Steel .'s subsidiaries which have es- shed a Jan. 16 effective date.

Iron . . .

Pig Iron Prices, Page 92

ew York—Pig iron consumers re- increasing stringency, although tage of iron to date has not re- d in any important curtailment roduction. Cast scrap and ferro- s are being used in greater vol- thus offsetting the iron scar- but the higher price of these erials has caused some restraint uying. Most foundries are op- ing full five days per week. Some melting on Saturday. There ld probably be more Saturday rations if it weren't for overtime e rates. These higher rates ap- to be a greater factor in holding t operations than stringency in materials. Increasing interest eing shown in foreign iron, but too much new buying has re- ed, due in part to extended de- y promises being made by some orters and the premiums asked by ers who can make deliveries with- he next four to five weeks.

uffalo — Merchant iron sellers guarding against consumers ding up large inventories with duction far short of meeting cur- t demands. A feeling prevails that l controls will be necessary as ernment contracts expand. Heavy vement of iron is reported to higan motor melters. Production ls at 100 per cent of capacity.

hiladelphia—Domestic pig iron ply is tighter, falling short of uirements. Operations at consum- plants are only being sustained ough greater use of scrap and roalloys and imports of foreign iron. Close to 15,000 tons of lean iron, recently placed on the rket, has been purchased for dis- ution to various consumers in this rict. A shipment of Brazilian pig is expected in the next two ks. This is a charcoal iron, sand t.

ittburgh—Raw material short- s have forced cutbacks in projec- production of radiation and enam- are products, causing a propor- ate reduction in orders booked ng foundries serving those indus- s. Bulk of foundries here are rating at practical capacity and it oped the quickening tempo of or- placements for direct and indi- military needs will take up the cated slack in consumer goods and. Output of foundries serving machine tool, steel mill machin- railroad and other basic indus- s will be restricted during 1951 only by the lack of adequate supplies of raw materials and manpower.

Cleveland—Merchant iron sellers are spreading the available tonnage among their customers as equitably as possible. As a result, while demand is considerably in excess of supply, no foundry shutdowns for lack of iron are reported. Only a relatively small proportion of the tonnage moving into consumption is against DO ratings. However, steady increase in emergency demands is indicated over coming weeks giving rise to talk in the trade of possible early application of strict government controls on supply and distribution.

Cincinnati—Shipments of merchant pig iron into this district last month fulfilled voluntary allocations. Foundry suspensions are being avoided through liberal use of scrap.

Chicago—Foundries are pressing for all the pig iron they can get and are meeting no success in having their allocations increased. Demand for iron considerably exceeds production with the result suppliers are obliged to maintain a close check on quotas. Of the district's 42 blast furnaces 38 are operating, one less than a month ago. Interlake Iron Corp. blew out its South Chicago A stack on Dec. 18 for repairs which will take from 45 to 60 days.

St. Louis—Pressure for pig iron deliveries mounts as the gap between

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supply and demand widens. Demand for castings is bringing even the smallest foundries to capacity operations. Pig shipments are dropping farther behind each month.

Seattle—Foundries are in receipt of some defense work and their order backlogs are rising. As a result demand for pig iron is pressing. Considerable foreign iron is enroute to the North Pacific area but sellers are refusing to make new commitments on future prices, accepting new business with reservations.

Scrap . . .

Scrap Prices, Page 100

Pittsburgh—Little activity in scrap transactions is noted with buyers and sellers expecting government action on price controls. Dealers are completing shipments on old orders as rapidly as possible. Trade anticipates that the price ceilings as finally adopted will represent a roll-back from current levels to anywhere from $40 to $45 for No. 1 heavy melting steel. Price relationships for other grades are seen adhering closely to that prevailing under OPA. Such action will force a substantial reduction in present quotations for cast grades and railroad specialties. The railroads have been asked by ESA to notify the agency, at least 7 days ahead of the date future lists will be offered, of the grades and prices expected to obtain for each. Some weakness in prices for railroad specialties already has developed. Crushers also contend they have been able to purchase local machine shop turnings for $37.

Philadelphia—While scrap demand continues strong in most grades, the pressure has eased pending price discussions in Washington this week. General belief is that there will be a rollback in prices, affecting all major grades, and cast and specialty grades in particular. A system somewhat similar to the old OPA is expected to be announced shortly, with bases on steel scrap possibly set up at Kansas City, Mo., and Houston, Tex., in addition to those which prevailed during World War II. Due to the large and scattered number of cast consumers, prices on cast grades likely will be set up on an f.o.b. shipping point basis as was previously the case.

Prices on malleable scrap have eased recently to $70-$72 and on No. 1 cast wheels to $68. No. 1 yard cast, on the other hand, is higher at $53. All other grades are unchanged.

New York—Pending the outcome of scrap price discussions in Washington—discussions which will continue into this week—brokers' buying prices here are unchanged. Meanwhile, there are various reports as to the extent of rollbacks. In view of the probability that there will be rollbacks, consumers are moving a shade less actively in the placing of business, especially where inventories warrant. However, there is still substantial buying.

Chicago—The scrap market here lacks the pressure of recent weeks with many consumers following a watch and wait policy. Prices paid for certain grades continue to reflect the easier tone which developed two weeks ago. The slackening is attributed to the fact that government price control seems inevitable and in the not too distant future with the result melters of cast grades and specialties choose not to purchase beyond current needs. Demand for turning grades is off markedly. Collection and preparation of scrap has been slowed considerably by recent heavy snows and severe weather. However, shipments of steelmaking grades are moving to mills in fairly substantial volume.

Cleveland—Scrap prices are holding steady here pending outcome of discussions now under way in Washington between government officials and representatives of the scrap producing, distributing and consuming interests. Consensus in the trade here is that a downward adjustment likely will be made within the next 30 days. Steel mills and foundries apparently are in a satisfactory supply position with shipments coming in on schedule. In view of the present price outlook, there is no incentive for withholding tonnages.

Buffalo—The scrap trade marks time as both sides await some definite stand on controls. Dealers are shipping against old orders as new business is deferred. Mild weather spurred movement of material this past week.

Detroit — Unallocated scrap continues in good demand at prices substantially above the formula. Electric furnace operators are paying as much as $50 delivered for No. 1 bundles. Bulk of automotive scrap is taken at the formula level but enough tonnage moves at higher prices and is of such importance to continuing operation of electric furnaces and foundries that it cannot be ignored pricewise. Trading at the higher level is exceedingly active. Operations are declining among automotive and appliance foundries but as yet no slackening in demand for good cast material is noticed.

Cincinnati — In general, formula prices are being maintained in the district iron and steel scrap market, and material is coming out freely. Cast prices are firm despite the discussions on possible rollbacks. However, demand is off, possibly a reflection of seasonal influences. Foundries' stocks of scrap are fair.

St. Louis—Cast scrap quotations have softened markedly in anticipation of a rollback. Dealer stocks are low, but tonnage on hand is going begging for the first time in months. Rail scrap, the other item believed here to be in for early controls, is steady. The Frisco road withdrew around 2000 tons. Heavy melting steel is steady with practically no buying last week. Shipments to this district are holding up well.

Los Angeles—Confusion and uncertainty rule the scrap market. Prices registered gains ranging from $1 to $3. No. 1 bundles are up $2 to $30, No. 2 bundles $2 to $28. No. 3 bundles rose $2.50 to $25. Punchings and plate scrap advanced $1 to $40 and rerolling rails, now $48, are up $3. Foundry scrap is in good supply.

San Francisco—Scrap dealers and consumers report there has been no "loosening" up in supply as a result of a National Production Authority regulation making it illegal to hoard steel, iron and nonferrous scrap. Iron and steel scrap has been moving to the mills as quickly as tonnage accumulates and little, if any, above normal inventory situations have been occuring in recent weeks. The mills report they have been drawing on scrap inventories to maintain their high operation.

Seattle—The scrap market is confused and erratic. Receipts are slow. Published quotations are nominal as each deal is negotiated. About 30,000 tons of steel scrap have arrived here from foreign areas in the last 60 days but mills are short with less than 90 days inventories.

Warehouse . . .

Warehouse Prices, Page 97

Philadelphia—Warehouses look for further decline in their bookings this month, as they doubt if M-6 relating to shipments from the mills will even sustain their incoming tonnage. One large distributor believes that shipments of major products from the mills for January and February will be off about 25 per cent from normal. To date distributors have had relatively little DO-rated tonnage.

Pittsburgh—Warehouse stocks of sheets and strip are so low some interests are limiting new bookings to DO orders, which they can extend to the mills as a basis for obtaining steel for stock replacement. Volume of this rated tonnage is still relatively light. Distributors' overall stock position continues to deteriorate as the mills are failing to meet previous delivery commitments. In addition to sheets and strip, suppliers of stainless products and cold-finished bars and plates have drastically reduced allotments for January and February delivery.

Cleveland—Inventory position of local warehouses is steadily deteriorating with consumer demand insistent and mill shipments not matching outgoing tonnage. Some distributors are in worse position than others since prior to the outbreak of the Korean war they had reduced their orders on the mills. Since warehouse allocations are based on the separate distributor's order volume on the mills in the first nine months of last year, those warehouses that had cut back their orders prior to June are receiving proportionately less tonnage than those that had continued to order their regular volume right through the first six months of the year.

Cincinnati—Pressure for steel from warehouses is increasing whereas the supply situation is worse. December volume was down because of depleted inventories. Replacements for stocks are lagging, and prospects for more liberal tonnage in first quarter, without control, are none too bright.

Chicago—Steel warehouses face the start of a new year with customer

and at very high level and with ntories badly depleted and unnced. Since demand exceeds steel ipts, a strict system of rationeing followed. Fear is that DO support programs will shortly l to proportions which will drasly shrink the tonnage of steel lable for civilian use under NPA's ctive M-6. This eventually will e many steel users to curtail their rations.

os Angeles — Steel distributors' ly out-of-balance inventories have ergone steady depletion since '. One warehouseman says stocks d at only 40 per cent of the l a year ago. Cuts of 60 to 70 per in first quarter allotment of -rated steel to warehouses is sing manufacturers of appliances consumer products to reduce opions.

an Francisco—Steel sheets are cing scarcer. Warehouses are bening to insist on DO numbers n fabricators on scarce items. 3, the supply houses feel, not only nore compatible to the prepared- program, but DO numbers also the warehouses in replenishing r stocks.

eattle—Warehouses ended the r with low inventories. Seasonal own is less acute than usual. st mills are slow in delivering, tern producers making a better ord although it is difficult to place 7 business.

anada . . .

'oronto, Ont.—Production of iron steel in Canada in the first 10 nths of 1950 attained an all time h record.

October pig iron production, 205,- net tons, compares with 199,415 s in September and 166,020 in Oc- er, 1949. Output included 149,- tons of basic, 16,319 tons of ndry iron and 39,921 tons of malble.

n the 10 months ended Oct. 31, n output was 1,903,262 net tons, ainst 1,825,023 tons in the 1949 iod and 1,779,905 tons in 1948.

Production of ferroalloys in October ounted to 16,959 net tons against 765 tons in September and 15,456 s in October, 1949. First 10 nths production of ferroalloys to- ed 149,314 net tons against 184,- tons in the like 1949 period.

Production of steel ingots and ting in October amounted to 293,- net tons and compares with 274,- tons in September and 258,891 s in October, 1949.

For the first 10 months of 1950 duction of steel ingots and cast- s totaled 2,803,401 net tons, com- ing with 2,663,259 tons in the like 9 period and 2,643,253 tons in 8.

RUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

tons, Lincoln Tunnel approaches, Jersey ty, N. J., for Port of New York Authority, Lehigh Structural Steel Co., Allentown, a.

1000 tons, Eielson Field, Alaska, power house, to Pacific Car & Foundry Co., Seattle; Peter Kiewit Sons Co., general contractor.

500 tons, boiler supports, Combustion Engineering Co., San Francisco, to Consolidated Western Steel Corp., Los Angeles.

400 tons, control tower, International Airport, New York, to Lehigh Structural Steel Co., Allentown, Pa.

300 tons, W. T. Grant store, New Haven, Conn., to Bethlehem Steel Co.

275 tons, school, Freeport, N. Y., to Dreier Structural Steel Co. Inc., Long Island City, N. Y.

225 tons, building 65, General Electric Co., Pittsfield, Mass., to Belmont Iron Works, Eddystone, Pa.

210 tons, W. T. Grant store, Jacksonville, Fla., to Aetna Steel Co., that city.

110 tons, state police barracks, Philadelphia, to Max Corchin & Sons, that city.

100 tons plus, Cowlitz power substation, to Isaacson Iron Works, Seattle, by Tacoma light department.

100 tons, molasses warehouse, Toledo, O., to Bethlehem Steel Co.

STRUCTURAL STEEL PENDING

16,400 tons, transmission towers, grillages, extensions, etc., for Bonneville Power Administration; Anthony M. Meyerstein, Brooklyn, N. Y., apparently low, $4,185,880; Bethlehem Pacific Coast Steel Corp., Seattle, second low $4,432,053.

9415 tons, Captree State Parkway bridge development for Jones Beach Parkway Authority, Suffolk county, New York; bids Jan. 26.

1400 tons, truss and girder span, Willamette river relocation project; L. H. Hoffman, Portland, Oreg., low $677,600, to U. S. Engineer, Portland.

1290 tons, state viaduct, route 25A, section 10, Newark, N. J.; bids Jan. 23.

1000 tons, addition, naval turbine testing laboratory, Trenton, N. J.; bids Jan. 25.

1000 tons, extension, Penn-Harris Hotel, Harrisburg, Pa.; bids Jan. 9.

700 tons, warehouse and office building, Raytheon Mfg. Co., Waltham, Mass.; bids in.

100 tons, Du Pont plant addition, Seaford, Del.; bids Jan. 11.

Unstated, service and rotor cranes, for Seattle light department; bids called Feb. 6.

REINFORCING BARS . . .

REINFORCING BARS PLACED

550 tons, laboratory and research building, Atomic Energy Commission, Newport, Ky., to Hugh J. Baker & Co., Indianapolis.

500 tons, auxiliary sewer, contract 3A, Chicago, to Ceco Steel Products Corp., Cicero, Ill.; M. J. Boyle & Co., Chicago, general contractor.

370 tons, Chippewa apartments, Chicago, to Joseph T. Ryerson & Son Inc., Chicago; Sumner S. Sollitt Construction Co., Chicago, general contractor.

218 tons, addition, Oak Park Hospital, Oak Park, Ill., to Ceco Steel Products Corp., Cicero, Ill.; J. W. Snyder Co., Chicago, general contractor.

REINFORCING BARS PENDING

5000 tons, second unit Seattle traffic viaduct; bids to Olympia, Wash., Jan. 9.

2200 tons, housing project, Louisville.

1450 tons, water filtration plant, Gary, Ind.; bids in.

890 tons, Wacker drive, Madison to Washington streets, Chicago.

800 tons, warehouse building, Minneapolis.

625 tons, steam-electric plant, Aurora, Minn.

500 tons, auxiliary sewer contract 3A, Chicago.

500 tons, high school, Louisville.

470 tons, Service Center Bldg., Rochester, Minn.

400 tons, blast furnace, Great Lakes Steel Corp., Detroit.

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376 tons, Dr. Norman Beatty Hospital, Westville, Ind.

245 tons, state viaduct, route 25A, section 10, Newark, N. J.; bids Jan. 23.

217 tons, terminal building, Hare airport, Chicago; Great Lakes Construction Co., Chicago, general contractor.

200 tons, children's hospital, Iowa City, Iowa.

Unstated, 360-foot box girder type span for Clark county, Washington; plans in preparation by Homer Hadley, Seattle; bids soon.

PLATES . . .

PLATES PLACED

1800 tons, four tanks, Royal Petroleum Co., Seymour, N. J., to Bethlehem Steel Co.

1600 tons, four tanks, Shell Oil Co., one in Saginaw, Mich., and three in Woodbridge, N. J., to Bethlehem Steel Co.

285 tons, one tank, Shell Oil Co., Charlottesville, N. C., to Chicago Bridge Co., Chicago.

200 tons, one tank, Shell Oil Co., New York, to Graver Tank & Mfg. Co. Inc., East Chicago, Ind.

100 tons or more, five storage tanks, total capacity 35,000 barrels, for Atomic Energy Commission, Idaho Falls, Idaho, to Olsen Mfg. Co., Boise, Idaho, low $58,900.

Unstated tonnage, five steel car floats for the Erie, to Bethlehem Steel Co.; equipment comprises two 16-car floats and three 10-car floats.

PIPE . . .

CAST IRON PIPE PLACED

75 tons, 2000 feet 20 inch, for Ship Creek project, Anchorage, Alaska, to H. G. Purcell, Seattle, for U. S. Pipe & Foundry Co., Burlington, N. J.; project involves 2000 tons, balance furnished by government.

CAST IRON PIPE PENDING

200 tons, King county District No. 20, Seattle; bids in Dec. 29.

RAILS, CARS . . .

LOCOMOTIVES PLACED

Union Pacific, 10 gas turbine electric locomotives, to General Electric Co., Schenectady, N. Y. Represents first order placed for this newest form of rail motive power.

RAILROAD CARS PLACED

Lehigh & New England, 500 fifty-ton hopper cars, to American Car & Foundry Co., New York.

RAILROAD CARS PENDING

Bangor & Aroostook, 500 refrigerator cars; pending.

FERROALLOYS

(*Continued from page* 97)

Si 4-6%, Mn 4-6%, C 4-6%). Add 1.1c to high-carbon ferrochrome prices.

Low-Carbon Ferrochrome: (Cr 67-72%.) Contract, carload, lump, bulk, max. 0.03% C 33.60c per lb of contained Cr, 0.04% C 31.50c, 0.06% C 30.50c, 0.10% C 30.00c, 0.15% C 29.75c, 0.20% C 29.50c, 0.50% C 29.25c, 1% C 29.00c, 1.50% C 28.85c, 2% C 28.75c. Carload packed add 1.1c, ton lot add 2.2c, less ton add 3.9c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome, Nitrogen Bearing: Add 5c to 0.10% C low-carbon ferrochrome prices for approx. 0.75% N. add 5c for each 0.25% of N above 0.75%.

Foundry Ferrochrome, High Carbon: (Cr 62-66%, C 5-7%). Contract, c.l. 8 M x D, bulk, 23.25c per lb of contained Cr, c.l., packed 24.15c, ton 25.50c, less ton 27.25c. Delivered. Spot, add 0.25c.

Foundry Ferrochrome, Low Carbon: (Cr 50-54%, Si 28-32%, C 1.25% max.) Contract, Carload, packed, 8 MxD, 16.10c per lb of alloy; 1 ton 16.95c; less ton lot, 18.15c, delivered; spot, add 0.25c.

Low-Carbon Ferrochrome Silicon: (Cr 34.41%, Si 42-49%, C 0.05% max.) Contract, carload, lump, 4" x down and 2" x down, bulk, 21.75c per lb of contained chromium plus 12.00c per pound of contained silicon; 1" x down, bulk 20.65c per pound of contained chromium plus 11.50c per pound of contained silicon, F.o.b. plant; freight allowed to destination.

Ferrochrome Silicon, No. 2: (Cr 36-39%, Si 36-39%, Al 7-9%, C 0.05% max.) 21.75c per lb of contained silicon plus 12.0c per lb of contained silicon plus aluminum, 3" x down, delivered.

Chromium Metal: (Min. 97% Cr and 1% Fe). Contract carload, 1" x D; packed, max 0.50% C grade, $1.08 per lb of contained chromium, ton lot $1.10, less ton $1.12. Delivered. Spot add 5c.

Tungsten Alloys

Ferrotungsten: (70-80%). Contract, 10,000 lb W or more, $3.25 per lb of contained W; 2000 lb W to 10,000 lb W, $3.35; less than 2000 lb W, $3.47. Spot, add 2c.

Tungsten Powder: (W 98.8% min.). Contract or spot, 1000 lb or more, $4.15 per lb of contained W; less than 1000 lb W, $4.25.

Silicon Alloys

25-30% Ferrosilicon: Contract, carload, lump, bulk, 19.00c per lb of contained Si; packed 20.40c; ton lot 21.50c, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 12.40c per lb of contained Si, carload packed 14.0c, ton lot 15.45c, less ton 17.1c. Delivered. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max.) Add 1.3c to 50% ferrosilicon prices.

75% Ferrosilicon: Contract, carload, lump, bulk, 14.3c per lb of contained Si, carload packed 15.6c, ton lot 16.75c, less ton 18.0c. Delivered, Spot, add 0.8c.

80-90% Ferrosilicon: Contract, carload, lump, bulk 15.55c per lb of contained Si, carload packed 16.8c, ton lot 17.8c, less ton 18.95c. Delivered. Spot, add 0.25c.

Low-Aluminum 85% Ferrosilicon: (Al 0.50% max.) Add 0.7c to 85% ferrosilicon prices.

90-95% Ferrosilicon: Contract, carload, lump, bulk, 17.5c per lb of contained Si, carload packed 18.7c, ton lot 19.65c, less ton 20.7c. Delivered. Spot, add 0.25c.

Low-Aluminum 90-95% Ferrosilicon: (Al 0.50% max.) Add 0.7c to 90-95% ferrosilicon prices.

Silicon Metal: (Min. 97% Si and 1% max. Fe). C.l. lump, bulk, regular 20.0c per lb of Si, c.l. packed 21.2c, ton lot 22.1c, less ton 23.1c. Add 1.5c for max. 0.10% calcium grade. Deduct 0.4c for max. 2% Fe grade analyzing min. 96% Si. Spot, add 0.25e.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe.) Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 8.65c per lb of alloy, ton lots packed 10.05c, 200 to 1999 lb 10.40c, smaller lots 10.90c.

Briquetted Alloys

Chromium Briquets: (Weighing approx. 3¾ lb each and containing exactly 2 lb of Cr). Contract, carload, bulk, 14.50c per lb of briquet, carload packed 15.2c, ton lot 16.0c, less ton 16.9c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing exactly 2 lb of Mn). Contract, carload, bulk 10.95c per lb of briquet, c.l. packaged 11.75c, ton lot 12.55c, less ton 13.45c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and approx. ½ lb of Si). Contract, c.l. bulk 11.15c, per lb of briquet, c.l. packed 11.95c, ton lot 12.75c, less ton 13.65c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing exactly 2 lb of Si) Contract, carload, bulk 6.95c per lb of briquet, c.l. packed 7.75c, ton lot 8.55c, less ton 9.45c. Delivered. Spot, add 0.25c.
(Small size—weighing approx 2½ lb and containing exactly 1 lb of Si). Carload, bulk 6.9c, c.l. packed 7.7c, ton lot 8.5c, less ton 9.40c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each) $1.14 per pound of Mo contained, f.o.b. Langeloth, Pa.

Calcium Alloys

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Contract, carload, lump, bulk 20.0c per lb of alloy, carload packed 21.0c, ton lot 22.3c, less ton 23.3c. Delivered. Spot add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.50-3%). Contract, carload, lump, bulk 19.0c per lb of alloy, carload packed 20.2c, ton lot 22.1c, less ton 23.6c. Delivered. Spot add 0.25c.

Titanium Alloys

Ferrotitanium, Low-Carbon: (Ti 20-25%, A 3.5% max., Si 4% max., C 0.10% max.) Contract, ton lots 2" x D, $1.40 per lb o contained Ti; less ton $1.45. (Ti 38-43%, A 8% max., Si 4% max., C 0.10% max.) To lot $1.28, less ton $1.35, f.o.b. Niagara Falls N. Y., freight allowed to St. Louis. Spot add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, 6-8%). Contract $167 per net ton, f.o.b. Ni agara Falls, N. Y., freight allowed to destina tions east of Mississippi river and north o Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, 3-4.5%.) Contract, $183 per ton, f.o.b. Ni agara Falls, N. Y., freight not exceeding St Louis rate allowed.

Vanadium Alloys

Ferrovanadium: Open-hearth Grade (Va 35 55%, Si 8-12% max., C 3-3.5% max.). Con tract, any quantity, $3.00 per lb of containe Va. Delivered. Spot, add 10c. **Crucible-Specia Grades** (Va 35-55%, Si 2-3.5% max., C 0.5 1% max.), $3.10. **Primos and High Spee Grades** (Va 35-55%, Si 1.50% max., C 0.20% max.) $3.20.

Grainal: Vanadium Grainal No. 1, 93c per lb No. 6 63c; No. 79, 45c, freight allowed.

Vanadium Oxide: Contract, less carload lot $1.20 per lb contained V_2O_5, freight allowed Spot, add 5c.

Zirconium Alloys

12-15% Zirconium Alloy: (Zr 12-15%, Si 39 43%, Fe 40-45%, C 0.20% max.). Contract c.l. lump, bulk 7.0c per lb of alloy, c.l packed 7.75c, ton lot 8.5c, less ton 9.35c Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47 52%, Fe 8-12%, C 0.50% max.). Contrac carload, lump, packed 20.25c per lb of allo ton lot 21c, less ton 22.25c. Freight allowed Spot, add 0.25c.

Boron Alloys

Ferroboron: (B 17.50% min., Si 1.50% max Al 0.50% max., C 0.50% max.). Contract 100 lb or more, 1" x D, $1.20 per lb of al loy. Less than 100 lb $1.30. Delivered. Spot add 5c. F.o.b. Washington, Pa., prices 10 lb and over are as follows: Grade A (10 14% B) 75c per pound; Grade B (14-18% B $1.20; Grade C (19% min. B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si), $5.25 pe lb contained B, delivered to destination.

Bortam: (B 1.5-1.9%). Ton lots, 45c per lb smaller lots, 50c per lb.

Carbortam: (B 1 to 2%) contract, lump ca loads 9.50c per lb, f.o.b. Suspension Bridg N. Y., freight allowed same as high-carbo ferrotitanium.

Other Ferroalloys

Ferrocolumbium: (Cb 50-60%, Si 8% max C 0.4% max.). Contract, ton lot, 2" x I $4.90 p er lb of contained Cb, less ton $4.9 Delivered. Spot, add 10c.

Ferrotantalum—Columbium: (Cb 40% approx Ta 20% approx., and Cb and Ta 60% min., 0.30 max.) ton lots, 2" x D, $3.75 per lb contained Cb plus Ta, delivered; less ton lo $3.80.

Silcaz Alloy: (Si 35-40%, Ca 9-11%, Al 6-8% Zr 3-5%, Ti 9-11%, B 0.55-0.75%). Carloa packed, 1" x D, 45c per lb of alloy, ton l 47c, less ton 49c. Delivered.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7% Fe 20% approx.). Contract, carload, packe ½" x 12 M, 17.5c per lb of alloy, ton lo 18.25c, less ton 19.5c. Delivered. Spot, ad 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 11%). C.l. packed, 17.0c per lb of alloy; to lots 18.0c; less ton lots 19.50c, f.o.b. Niaga Falls, N. Y.; freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19% Mn 8-11%). C.l. packed, 14.25c per lb alloy; ton lots 15.75c; less ton lots 17.00 f.o.b. Niagara Falls, N. Y.; freight allow to St. Louis.

Simanal: (Approx 20% each Si, Mn, Al; be Fe) Lump, carload, bulk 14.50c, packed 15.50 ton lots, packed, 15.75c; less ton lots, packe 16.25c per lb of alloy, delivered to destinati within United States.

Ferrophosphorus: (23-25% based on 24% content with unitage of $3 for each 1% of above or below the base); carloads, f.o. seller's works, Mt. Pleasant, or Siglo, Tenn $65 per gross ton.

Ferromolybdenum: (55-75%). Per lb, co tained Mo, f.o.b. Langeloth, $1.32; Washin ton, Pa., furnace, any quantity $1.13.

Technical Molybdic-Oxide: Per lb, contain Mo., f.o.b. Langeloth $1.14, packed in ba containing 20 lb of molybdenum; Washingto Pa., 95.00c.

Metalworking Briefs . . .

CONSTRUCTION—ENTERPRISE—ORGANIZATIONAL CHANGES

California

veland Cap Screw Co., Cleveland, appointed San Fran- o office of Round California Chain Co. as its sales resentative in northern California; the Los Angeles ce, its representative in southern California, Arizona New Mexico.

California

ration of its new plant in the Los Angeles Interna- al Airport industrial tract, beginning Jan. 1, increases duction capacity of **Tubing Appliance Co. Inc.** about old. The firm makes open-end wrenches.

District of Columbia

eral Electric Co., Schenectady, N. Y., opened a plant Washington for the manufacture of germanium prod- , previously made at the company's Syracuse, N. Y., nt. Germanium products are miniature crystal.

Illinois

strut Products Co., Chicago, plans construction of a ding in Bellwood, Ill., to be headquarters, display m and warehouse for the company. First unit of the icture will cost about $400,000.

Delaware

acaloy Corp.—steel and metal hardening compounds—d a charter of incorporation with the secretary of e's office, Dover, Del. Capital of the firm is listed $500,000. U. S. Corporation Co., Dover, is serving as principal office.

Delaware

ris Corp.—machines—was chartered by the secretary state's office, Dover, Del. Capital of the firm is listed $300,000. Prentice-Hall Corporation System, Dover, is ving as the principal office.

Delaware

lie Welding Co. Inc.—welding—was chartered by the retary of state's office, Dover, Del. Capital of the n is listed at $150,000. U. S. Corporation Co., Dover, erving as the principal office.

Delaware

ll Bit & Tool Co.—drill bits, etc.—filed a charter of rporation with the secretary of state's office, Dover, . Capital of the firm is listed at $5 million. Corpora- n Trust Co., Wilmington, Del., is serving as the princi- office.

Maryland

itehead Metal Products Co. Inc., New York, moved its timore metal warehouse to enlarged and improved rters at 4300 E. Monument St., that city. John W. rple is the resident branch manager.

Maryland

ndix Radio Division of Bendix Aviation Corp., Towson, ., which will shortly occupy additional space, has plans about double its present facilities by next July. E. K. ster is general manager.

Massachusetts

rd Steel Co. opened a new warehouse and general of- e building at 87 Rindge Avenue Extension, Cambridge Mass.

Michigan

balt Inc., manufacturer of nonferrous cast-alloy cut- g tools and wear-resistant alloys, moved into its new nt at 2800 S. State St., Ann Arbor, Mich. The build- is the first of several units to be erected,

Michigan

llman Engineering Co., Cleveland, purchased the prop- y and business of Anker-Holth Mfg. Co., Port Huron, ch., producer of hydraulic and air-operated cylinders, cks and collets, air valves and accessories. J. C. dge, executive vice president of Wellman, will super- e the operation of the Anker-Holth Division of the com- ny. W. L. Komph will continue as manager of sales d engineering and F. J. Theisen as plant manager.

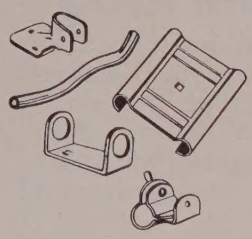
New York

lland Electric Equipment Co. Inc., Buffalo, was named dealer for Allis-Chalmers motors, controls and trans- mers in Erie and Niagara counties, New York.

New York

$400,000 expansion program for **Electro Refractories & loys Corp.,** Buffalo, is planned. About $150,000 will be nt for additional manufacturing and research equip- nt at its plant in that city. About $250,000 will be nt for additional buildings and equipment at the com-

METAL *Fabricating*



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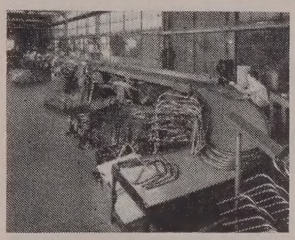

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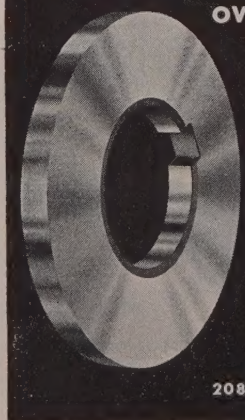

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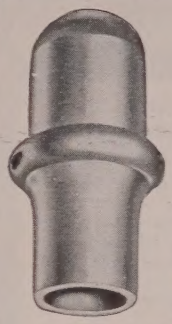

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bon Engineering Corp., Cleveland, appointed Ritter ineering Co., Pittsburgh, as exclusive distributor in t district for its centralized lubrication system.

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iance Electric & Engineering Co., Cleveland, estab- ed new branch sales offices in Newark, N. J., and El ado, Ark., and transferred from Syracuse to Buffalo district office directing the company's sales through- northern and western New York state. C. B. Allen istrict manager in Buffalo, heading up the work for- ly handled from Syracuse by G. E. Bevis, now a vice sident of the recently acquired Canadian division of iance at Welland, Ont. William H. Brehmer is the nch manager in Syracuse. Elwood H. Koontz is branch nager in Newark, assisted by F. R. Obenchain, sales ineer. R. C. Suttle is manager of the El Dorado office.

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sburgh Plate Glass Co., Pittsburgh, has expended e than $80 million since the close of World War II replacement of equipment, alterations to existing fa- ies and the construction of new factories and mer- ndising outlets.

Tennessee

nessee Eastman Corp., Kingsport, Tenn., producer of ulose products and chemicals and a wholly-owned sub- ary of Eastman Kodak Co., Rochester, N. Y., was dis- ed as a separate corporation and is now a division of parent company.

Texas

liburton Oil Well Cementing Co., Duncan, Okla., has ns in progress for an addition to its plant in Houston. imated cost is $130,000. Charles S. Chase, Houston, he architect.

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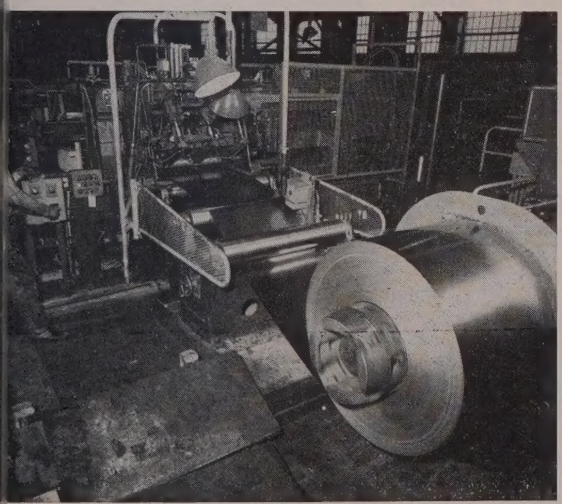
struction of an office, warehouse and manufacturing repair plant in Richmond, Va., for **Westinghouse ctric Corp.,** Pittsburgh, will begin soon. All Westing- se activities, except those of Westinghouse Electric ply Co., in that city will be consolidated in the build- , scheduled to be completed early in 1952.



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